"A STUDY ON ROLE OF DIAGNOSTIC LAPAROSCOPY IN EVALUATION OF CHRONIC LOWER ABDOMINAL PAIN"

Dissertation submitted to

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI

With partial fulfillment of the regulations for the award of the degree of

M.S (General Surgery)

Branch-I

Government Kilpauk Medical College

Chennai

May - 2019

BONAFIDE CERTIFICATE

This is to certify that the dissertation entitled **"A STUDY ON ROLE OF DIAGNOSTIC LAPAROSCOPY IN EVALUATION OF CHRONIC LOWER ABDOMINAL PAIN"** at Govt. Kilpauk Medical College Hospitals a bonafide work of **Dr. VAITHEESWARAN M,** submitted to The Tamilnadu Dr. M.G.R Medical University in partial fulfillment of requirements for the award of the degree of M.S. BRANCH I (GENERAL SURGERY) examination to be held in MAY, 2019.

Prof. V. Vijayalakshmi, M.S.,
Professor of General Surgery
Govt. Kilpauk Medical College,
Chennai – 600 010.

Prof. V. Ramalakshmi, M.S.,
H.O.D, Dept. of General Surgery
Govt. Kilpauk Medical College,
Chennai – 600 010.

PROF. P. VASANTHAMANI,
MD., DGO., MNAMS., DCPSY., MBA
DEAN
Government Kilpauk Medical College & Hospital
Chennai – 600 010

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled **"A STUDY ON ROLE OF DIAGNOSTIC LAPAROSCOPY IN EVALUATION OF CHRONIC LOWER ABDOMINAL PAIN"** at Govt. Kilpauk Medical College Hospital is a bonafide and genuine research work carried out by me in the Department of General Surgery, Government Kilpauk Medical and Hospital, Chennai-10, under the guidance of our Chief **Prof. Dr. V. VIJAYALAKSHMI,MS.,** Government Kilpauk Medical College and Hospital.

This dissertation is submitted to **THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI** in partial fulfilment of the University regulations for the award of M.S degree (General Surgery) Branch I, examination to be held in MAY 2019.

Date: **Dr. M. VAITHEESWARAN**

Place: Chennai

CERTIFICATE BY THE GUIDE

This is to certify that the dissertation titled **"A STUDY ON ROLE OF DIAGNOSTIC LAPAROSCOPY IN EVALUATION OF CHRONIC LOWER ABDOMINAL PAIN"** in the General Surgery Department at Govt. Kilpauk Medical College Hospitalis a bonafide research work done by **Dr. M.VAITHEESWARAN,** post graduate in M.S. General Surgery, Government Kilpauk Medical College & Hospital, Chennai-10 under my direct guidance and supervision in my satisfaction and in partial fulfillment of the requirements for the degree of **M.S. General Surgery**.

Prof. V. VIJAYALAKSHMI,M.S.,
Professor of General Surgery,
Govt. Kilpauk Medical College,
Chennai-10

Date :

Place : Chennai

ACKNOWLEDGEMENT

I am most thankful to **Prof. P.VASANTHAMANI MD., DGO., MNAMS., DCPSY., MBA.** Dean, Kilpauk Medical College and Hospital for giving me the opportunity to conduct this study in the Department of General Surgery, Government Kilpauk Medical College & Hospital, Chennai-10.

I thank **Prof. V. RAMALAKSHMI,** M.S, Professor and Head of the department of General Surgery for his relentless care and concern that he has shown towards me to bring out this dissertation.

My deepest gratitude to my guide and mentor **Prof. V. VIJAYALAKSHMI,** Professor of the Department, Department of General Surgery, Kilpauk Medical College, who has inspired me immeasurably during my training as a post graduate student.

I also acknowledge the invaluable advice and inputs received from **Dr. Arun. D.M.S and Dr. Amilthan K.M.S** in shaping up this study.

This study would have not been possible without the support of my fellow post graduates and interns who have been a great source of help.

The most important part of any medical research is patients. I owe a great deal of gratitude to each and every one of them.

I would like to thank God for all that he has bestowed upon me.

I would like to thank my parents for making me who I am today and for supporting me in every deed of mine

I thank each and every person involved in making this manuscript from inception to publication.

INSTITUTIONAL ETHICS COMMITTEE
GOVT. KILPAUK MEDICAL COLLEGE,
CHENNAI-10

Protocol ID. No. 57/2018 Meeting held on 13.02.2018

The Institutional Ethical Committee of Govt. Kilpauk Medical College, Chennai reviewed and discussed the application for approval "***A STUDY ON ROLE OF DIAGNOSTIC LAPAROSCOPY IN EVALUATION OF CHRONIC LOWER ABDOMINAL PAIN***" submitted by Dr.M.Vaitheeswaran, Post Graduate in General Surgery, Dept. of General Surgery, Govt. Kilpauk Medical College, Chennai-10.

The Proposal is **APPROVED.**

The Institutional Ethical Committee expects to be informed about the progress of the study any Adverse Drug Reaction Occurring in the Course of the study any change in the protocol and patient information /informed consent and asks to be provided a copy of the final report.

26.2.2018

DEAN
Govt. Kilpauk Medical College,
Chennai-10.

26-2-18

ME 1 Sec> Ethical Committee

URKUND

Urkund Analysis Result

Analysed Document:	PLAGIARISM.docx (D42444490)
Submitted:	10/11/2018 9:52:00 PM
Submitted By:	vaithyrocks@gmail.com
Significance:	1 %

Sources included in the report:

FAYIZ SIR FINAL PLAGIARISM.docx (D30918793)

Instances where selected sources appear:

1

PLAGIARISM CERTIFICATE

This is to certify that this dissertation work titled **"A STUDY ON ROLE OF DIAGNOSTIC LAPAROSCOPY IN EVALUATION OF CHRONIC LOWER ABDOMINAL PAIN"** of the candidate **Dr. M. VAITHEESWARAN** with registration number **221611168** for the award of MS in the branch of GENERAL SURGERY. I personally verified the urkund.com website for the purpose of plagiarism check. I found that uploaded thesis file contains from introduction to conclusion pages and result shows **1** percentage of plagiarism in the dissertation.

Guide & supervisor sign with seal

TABLE OF CONTENTS

INTRODUCTION

In our surgical practice we often encounter patients with undiagnosed lower abdominal pain who even after careful evaluation with sophisticated investigations remain undiagnosed[1]. This group of patients pose a major challenge to the diagnostic capabilities of the surgeon. These patients with undiagnosed abdominal pain are difficult to treat and they tend to have a chronic phase of suffering from the unremitting nature of the pain. This results in loss of doctor patient relationship.

This situation leads to chronic form of depression among these patients. These group of patients are often neglected and they are labeled as functional. To overcome this situation, these patients must be investigated in a proper manner and a goal directed approach has to be followed.

Diagnostic laparoscopy is a valuable tool that can be used in these group of patients to overcome this problem[2]. Diagnostic laparoscopy is used in these patients when the modern imaging techniques fall short in identifying the causes of undiagnosed lower abdominal pain[3].

Diagnostic laparoscopy allows the surgeon to visualize the internal organs and help in identifying the pathologies that are not apparent to the

modern day imaging studies. It is much more helpful in female patients whose gynaecological problems offer a great deal of difficulty in coming to a diagnosis.

There are numerous differential diagnoses for the patients with undiagnosed chronic lower abdominal pain. Since diagnostic laparoscopy has a high yield in diagnosing these patients, it has become a major diagnostic modality in surgeons armory.

These patients are evaluated clinically and with imaging studies. Patients who remain undiagnosed are given the choice of diagnostic laparoscopy to identify the cause. Patients giving consent are further evaluated with diagnostic laparoscopy.

AIM OF THE STUDY

- To assess the benefit of using laparoscopy as a diagnostic tool in patients with undiagnosed chronic lower abdominal pain.
- To find various causes leading to chronic abdominal pain by diagnostic laparoscopy

REVIEW OF LITERATURE

ANATOMY:

Pain in the lower abdomen is due to the organs present in right iliac fossa, hypogastrium and left iliac fossa. Structures located are as follows;

Right iliac fossa in males;

1. Terminal ileum
2. Caecum
3. Vermiform Appendix
4. Right ureter
5. Lymph nodes
6. Mesentery

HYPOGASTRIUM IN MALES

1. Bladder
2. Terminal parts of both ureters
3. Prostate
4. Rectum

LEFT ILIAC FOSSA IN MALES

1. Descending colon
2. Sigmoid colon
3. Sigmoid mesentery
4. Lymph nodes
5. Left ureter

RIGHT ILIAC FOSSA IN FEMALES:

1. Terminal ileum
2. Caecum
3. Vermiform appendix
4. Lymph nodes
5. Mesentery
6. Right ureter
7. Right fallopian tube
8. Right ovary

HYPOGASTRIUM IN FEMALES

1. Urinary Bladder
2. Uterus
3. Terminal parts of both ureters
4. Rectum

LEFT ILIAC FOSSA IN FEMALES

1. Descending colon
2. Sigmoid colon
3. Sigmoid mesentery
4. Lymph nodes
5. Left ureter
6. Left Ovary
7. Left fallopian tube

Lower abdominal pain is difficult to diagnose because of the presence of organs of various systems in the lower abdomen. This difficulty is even more amplified in female patients in whom gynaecological problems pose a major diagnostic difficulty. Differential diagnoses are many and they mimic each other making the life of the surgeon much more difficult.

Various causes have been attributed to the development of the lower abdomen pain. Most of the common causes are diagnosed either clinically or radiologically. But some patients do remain undiagnosed.

Chronic appendicitis and adhesions are the frequently encountered causes[4]. Abdominal tuberculosis continues to be one of the major causes

in our country. Even our modern day imaging studies fail to diagnose them eventually paving way for diagnostic laparoscopy.

Gastro intestinal causes:

1. Sub acute / chronic appendicitis
2. Adhesions
3. Ileocecal tuberculosis
4. Mesenteric lymphadenitis
5. Meckel's diverticulitis
6. Mesenteric panniculitis
7. Sigmoid diverticulosis
8. Incisional hernia
9. Inflammatory bowel disease
10. Carcinoma cecum

Gynaecological causes:

1. Adnexitis and tubo ovarian abscess
2. Hydro salphinx
3. Ovarian cysts
4. Endometriosis
5. Uterine fibroid
6. Pelvic inflammatory disease

Urological causes:

1. Urolithiasis
2. Cystitis

Orthopedic and neurological causes:

1. Sacroileitis
2. Radicular pain
3. Cox arthrosis

Acute appendicitis is the most common indication for an abdominal surgery in the world with a life time incidence of about 10%[5]. Chronic appendicitis should be suspected in patients with more than seven days of pain in the right iliac fossa[6]. Its precise etiology is not known. Recurrent appendicitis occurs from transient obstruction of the appendix due to excess mucus production.

Obstruction of the lumen remains to be the main cause of appendicitis. It can be due to faecolith, foreign body, round worm, thread worm or due to purgatives. It may occur at any age but most frequently seen in second and third decades.

Pain is the most frequent symptom reported. Anatomical variation of the position of the appendix can alter the site of tenderness. The classic

sequence of pain, vomiting and temperature is known as Murphy's syndrome.

Tenderness is elicited over the McBurney's point. In cases of retrocecal appendicitis and pelvic appendicitis tenderness may not be apparent over the McBurney's point.

An elevated WBC count and neutrophilia is in favour of appendicitis[7]. Ultrasonography can identify blind ending, non compressible, aperistalstic structure in the right iliac fossa. Sonography has a sensitivity of about 85% and specificity of about 90%[8].

Ultrasonography also has an additional benefit of diagnosing pelvic pathologies in young females of reproductive age group. It can offer valuable information regarding ovaries, fallopian tubes and uterus. However, ultrasonography is operator dependent.

Computed tomography is a valuable tool in diagnosing patients with lower abdominal pain. It has sensitivity of about 90% and specificity of about 90% in diagnosing appendicitis[9].

Abdominal adhesions are bands of scar tissue that can be fibrous or fibrous fatty in nature. They are most commonly seen as a complication of previous abdominal surgery.

Adhesions can be due to

1. Multiple abdominal operations and previous postoperative intra-abdominal complications
2. Intra-abdominal inflammatory disease not treated with surgery
3. Post-radiation therapy

Adhesions are formed between interconnecting loops of bowel. Adhesions also attach loops of bowel to the parietal peritoneum, especially the abdominal wall and the sub-peritoneal organs.

Intra-abdominal adhesions are diagnosed based on indirect signs or abnormal visceral slide. Abdominal adhesions are rarely visible on CTCT scans[10].It is helpful in the detection of adhesion-related complications, such as bowel obstruction or bowel ischaemia. An abrupt transition from dilated to collapsed bowel segments may be the only hint for the presence of adhesions that are depicted on CT scans.

Mesenteric lymphadenitis is the presence of three or more lymph nodes that are each 5 mm or greater in the short axis. Short axis diameter of >8 mm might be a more appropriate for defining mesenteric lymphadenopathy.

Vomiting and fever are the symptoms associated with mesenteric lymphadenitis. It mimics appendicitis. Clinically, it can be differentiated

from appendicitis by the presence of shifting tenderness also known as Klein’s sign.

Enlarged mesenteric lymph nodes are also associated with a range of pathological conditions namely crohn’s disease, gastroenteritis, appendicitis, yersinia, cat scratch disease and AIDS.

Mesenteric lymphadenitis is usually managed conservatively and the patients usually recover well.

Abdominal tuberculosis is one of the most prevalent forms of extra-pulmonary tuberculosis. Abdominal involvement had been reported to be 55%-90% in patients before the advent of specific anti-TB drugs. After the development of specific drugs, it was regressed to 25%. It has an insidious course. It does not have any specific laboratory, radiological or clinical findings.

Classification of abdominal tuberculosis

1. Peritoneal tuberculosis
2. Tubercular lymphadenopathy
3. Acute
4. Chronic
5. Fixed fibrotic type

6. Wet ascitic type

7. Dry plastic type

8. Visceral tuberculosis

9. Encysted/loculated type

10. Liver, pancreas, spleen etc.

11. Esophageal tuberculosis

12. Gastrointestinal tuberculosis

13. Duodenal tuberculosis

14. Gastric tuberculosis

15. Jejunal and ileocecal tuberculosis

16. Colorectal tuberculosis

Anti tubercular therapy remains the treatment of choice. Surgery is indicated in patients with intestinal obstruction, severe haemorrhage, bowel perforation and intra abdominal abscess.

Meckel's diverticulum is one of the most common congenital gastrointestinal anomaly. About 2-4% of patients with a Meckel's will subsequently develop complications.

Most common complications are intestinal hemorrhage, intestinal obstruction, and diverticulitis. These complications are most commonly present in children. In older adults, Meckel's diverticulitis is included in the differential diagnosis.

CT diagnosis of an uninflamed Meckel's diverticulum is difficult. It is due to the similar attenuation of the diverticulum and the bowel wall. Investigation of choice is technetium radio isotope scan. Laparoscopy can be used diagnostically as well as therapeutically.

Pelvic inflammatory disease (PID) is commonly seen in women attending the genitourinary clinic. It is due to the acute inflammation caused by micro-organisms colonising the endocervix, which ascend to the endometrium, fallopian tubes, and ovaries.

PID is a clinical diagnosis.. It initially involves cervicitis and progresses to endometritis eventually leading to salpingo-oophoritis.

Chronic lower abdominal pain following PID is due to the scarring, tissue damage, and adhesions formed from it. The nerves can be damaged or the structures can adhere to it. It results in painful stretching by activities such as exercise, sexual intercourse or passage of food through the bowel.

Conservative treatment includes administration of antibiotics, analgesics and anti inflammatory drugs.

Endometriosis is defined by the presence and proliferation of functional endometrial tissue containing both glands and stroma at sites outside the endometrial cavity. Most frequent sites of implantation being the pelvic viscera and peritoneum. However, adenomyosis is defined by the presence of endometrial glands within the myometrium. Adenomyosis can also cause chronic pain, especially dysmenorrhoea.

Many theories have been proposed to explain the pathogenesis of endometriosis. The mechanism of chronic pain from this condition is unclear. It can be due to the release of prostaglandins to the peritoneal surfaces by the products of menstruation and by the swelling and stretching of the tissue. It can also be due to nerve damage secondary to scarring that occurs around the implants. Endometriosis is common among women between the ages of 30 and 45 years.

Symptoms include deep dyspareunia, dysmenorrhoea, and constant pelvic pain. Laparoscopy is very much useful in diagnosing and treating endometriosis at the same sitting.

Ovarian remnant syndrome is seen after hysterectomy and bilateral salpingo-oophorectomy for severe endometriosis or pelvic inflammatory disease. It results from residual ovarian cortical tissue that is left back due to difficult surgical dissection during oophorectomy.

Ovarian cysts can also result in unilateral pelvic pain. Symptomatic ovarian cysts can be diagnosed and treated by laparoscopy at the same sitting. Adnexitis, hydrosalphinx and tuboovarian masses are common during the reproductive age groups.

Diverticula are small, bulging pouches that occur in the lining of bowel wall. They are most commonly seen in large intestine (colon). Diverticula are common after 40 years of age and are usually asymptomatic.

However, one or more of the pouches become inflamed or infected. It is known as diverticulitis. It can cause severe abdominal pain, fever, nausea and altered bowel habits.

The signs and symptoms of diverticulitis include:

- Pain,
- Nausea and vomiting.
- Abdominal tenderness.

- Fever.
- Constipation or, less commonly, diarrhea.

Diverticulitis is diagnosed with colonoscopy and computed tomography scans. It can be mild, severe and recurring. Mild diverticulitis is treated with rest, changes in diet and antibiotics. Severe or recurring diverticulitis might require surgery.

Mesenteric panniculitis is a disorder characterised by a chronic non-specific inflammation involving the adipose tissue present in the bowel mesentery.

The exact aetiology is not known. It can be due to autoimmunity, infection, trauma, ischaemia, prior abdominal surgery and neoplasm. Prevalence of mesenteric panniculitisis about 0.6%.

Sclerosing mesenteritis is classified into three types namely

- Mesenteric panniculitis
- Mesenteric lipodystrophy
- Retractile mesenteritis

Idiopathic inflammatory disorders namely, retroperitoneal fibrosis, sclerosing cholangitis, Riedel thyroiditis and orbital pseudotumour are

associated with it. CT plays an important role in diagnosingin this condition and can be useful in distinguishing sclerosing mesenteritis from other forms of mesenteric diseases.

Carcinoma of the colon sometimes can present with chronic abdominal pain, loss of weight, loss of appetite and altered bowel habits.

Other extra intestinal causes of chronic abdominal pain should be borne in mind and a thorough search should be made before subjecting the patient to various investigations.

Chronic lower abdominal usually presents a challenging scenario to the surgeon. Role of laparoscopy in diagnosing these patients have been studied by many authors [11 ,12,] . Diagnostic laparoscopy offers many advantages[13, 14 ·] Almost 13%% of the patients remain undiagnosed even after battery of sophisticated investigations[15]. The history and physical examination are the key elements determining the diagnostic workup for a particular patients.

Patients should the asked about the nature of the pain, onset, progression, radiation, aggravating and relieving factors. Associated symptoms such as nausea, vomiting, loss of weight, loss of appetite, altered bowel habits, burning micturition and white discharge per vaginally should be enquired.

Previous abdominal surgery should be enquired and noted. Abdomen should be thoroughly examined in a systematic manner. Any scar over the abdomen should not be missed. Renal angles, hernia orifices and external genitalia should be examined for any pathologies. Per rectal examination should be done and all female patients should undergo per vaginal examination.

Despite adequate clinical examination these group of patients fail to yield a definite diagnosis. Blood investigations are useful in diagnosing inflammatory conditions. Commonly used blood investigations include complete blood count, renal function tests and liver function tests.

Urinalysis and urine culture can help in diagnosing urolithiasis and urinary tract infections. Patients with history suggesting urological problems should be evaluated with x ray KUB, ultrasonography and CT KUB. If a definite diagnosis is made with these investigations, they should be managed accordingly.

Patients with history suggestive of lower gastro intestinal symptoms should be evaluated with colonoscopy and CT scanning.

Conditions involving the female reproductive tract such as adnexitis, symptomatic ovarian cysts, pelvic inflammatory diseases and endometriosis should be subjected to proper gynaecological examination and endovaginal ultrasound examination. Diagnostic laparoscopy can be

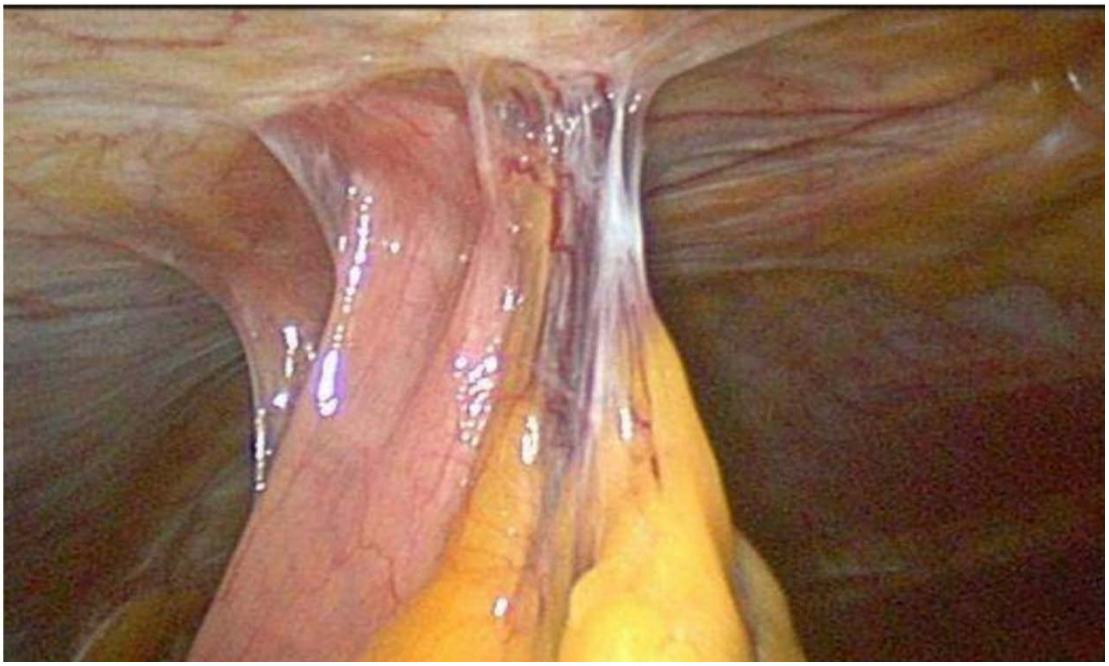
used in fertile women and it can avoid unnecessary appendectomies[16.] If needed CT evaluation can be done. If a definite diagnosis is made at any point, definite treatment is initiated.

Every effort should be made to rule out other causes such as orthopedic and neurological causes with the help of radiological and clinical examination.

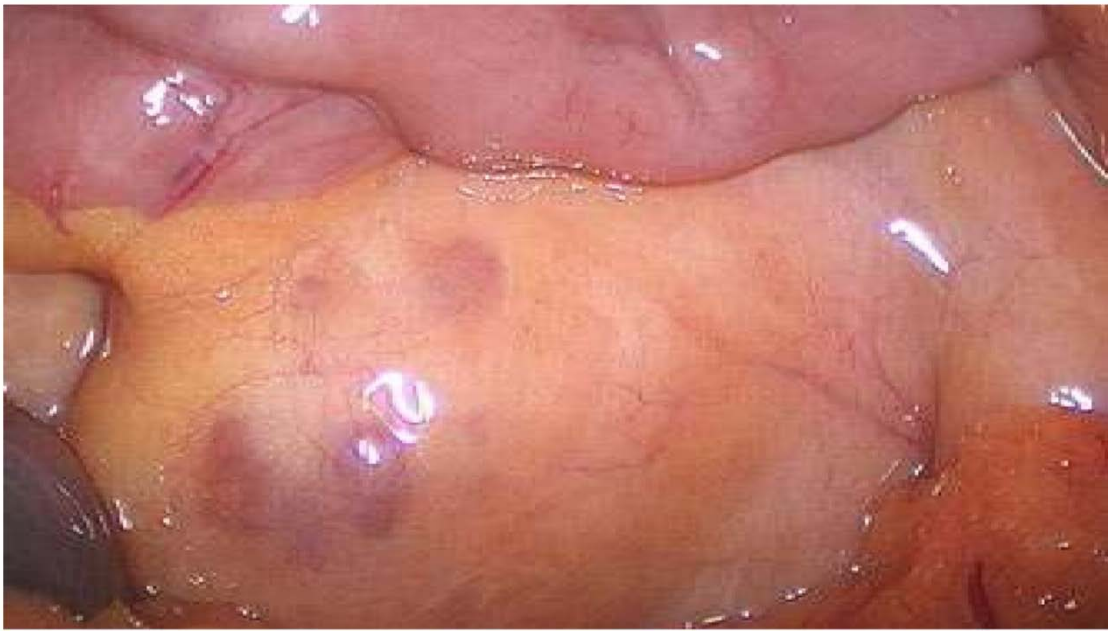
About 13% of the patients remain undiagnosed even after careful evaluation with all sophisticated investigations such as clinical examination, x ray, ultrasonography and computed tomography.

Laparoscopy is a boon to these group of patients as it can be used for diagnosing as well as treating these group of patients with chronic lower abdominal pain. Diagnostic laparoscopy helps in avoiding unnecessary laparotomies. The use of diagnostic laparoscopy to study these patients have been studied by many authors[17,18.] It helps the surgeons to visualize the internal organs with greater detail and helps in diagnosing conditions that are not apparent by other techniques.

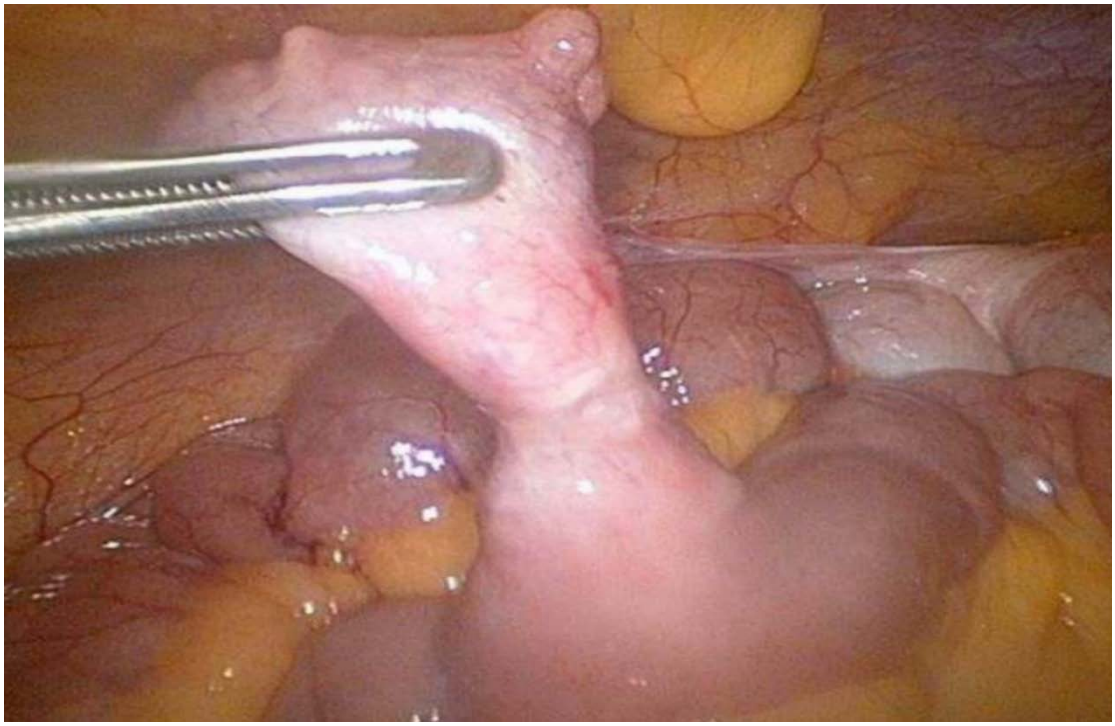
In the studies conducted by the previous authours, appendicitis, adhesions and abdominal tuberculosis form the majority of the diagnoses. Laparoscopy is helpful as these conditions can be treated laparoscopically if possible.



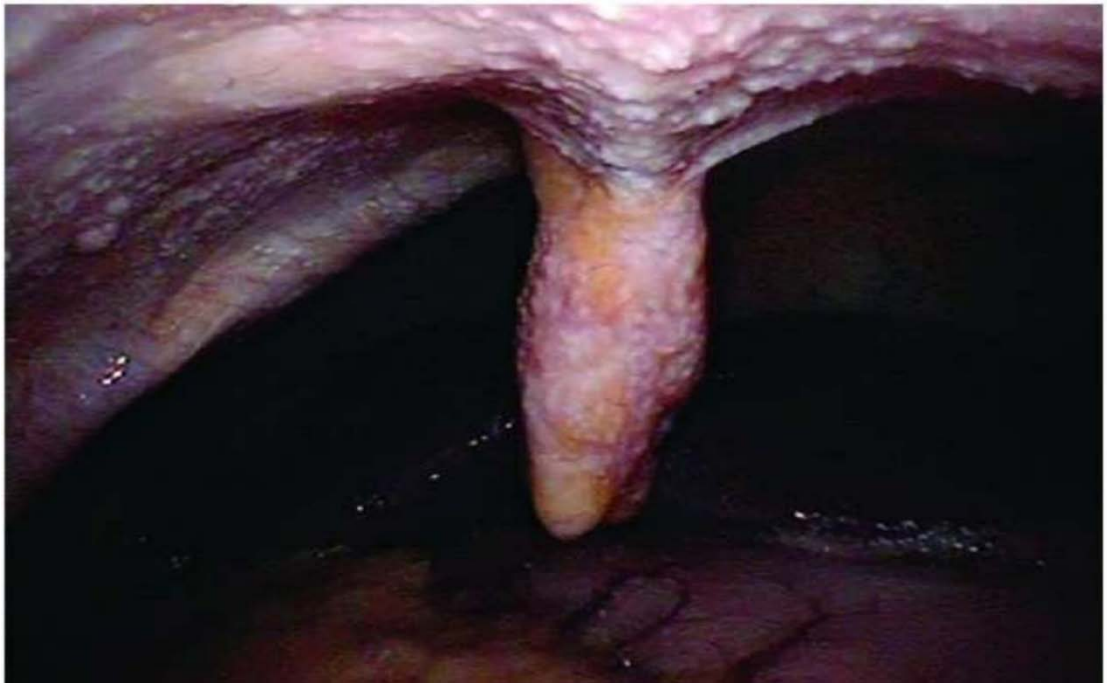
ADHESIONS



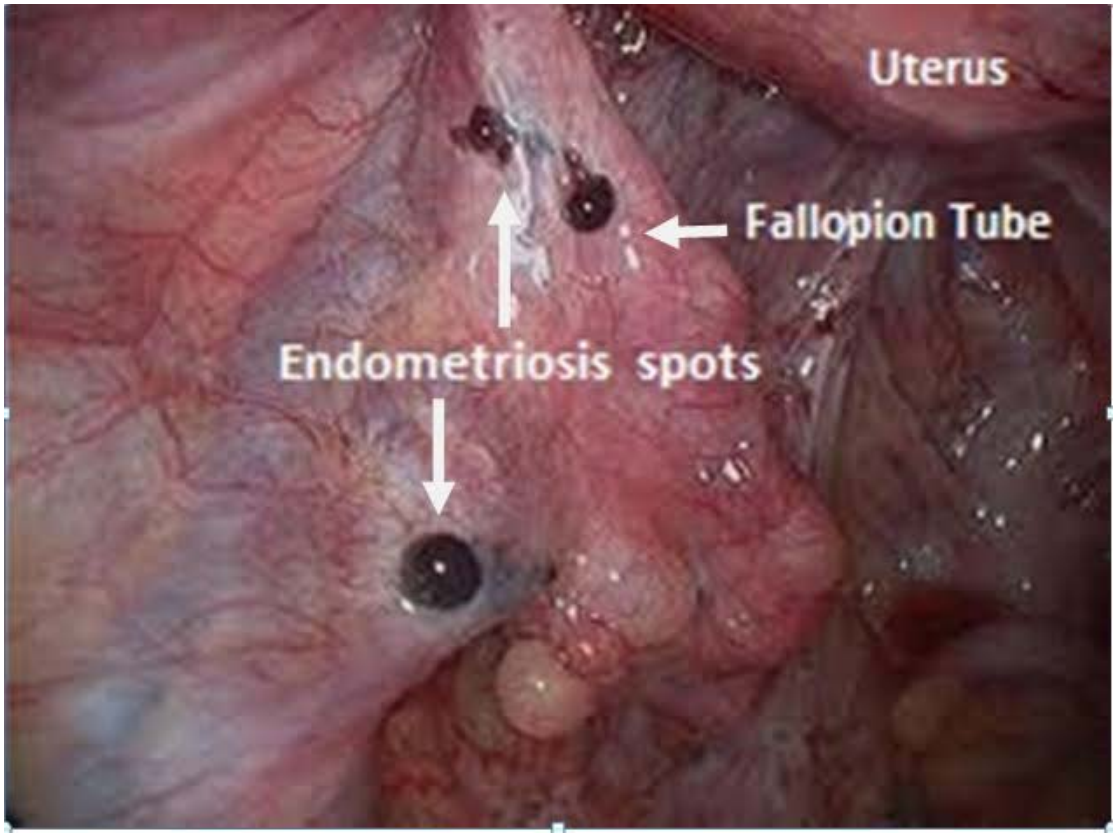
MESENTERIC ADENOPATHY



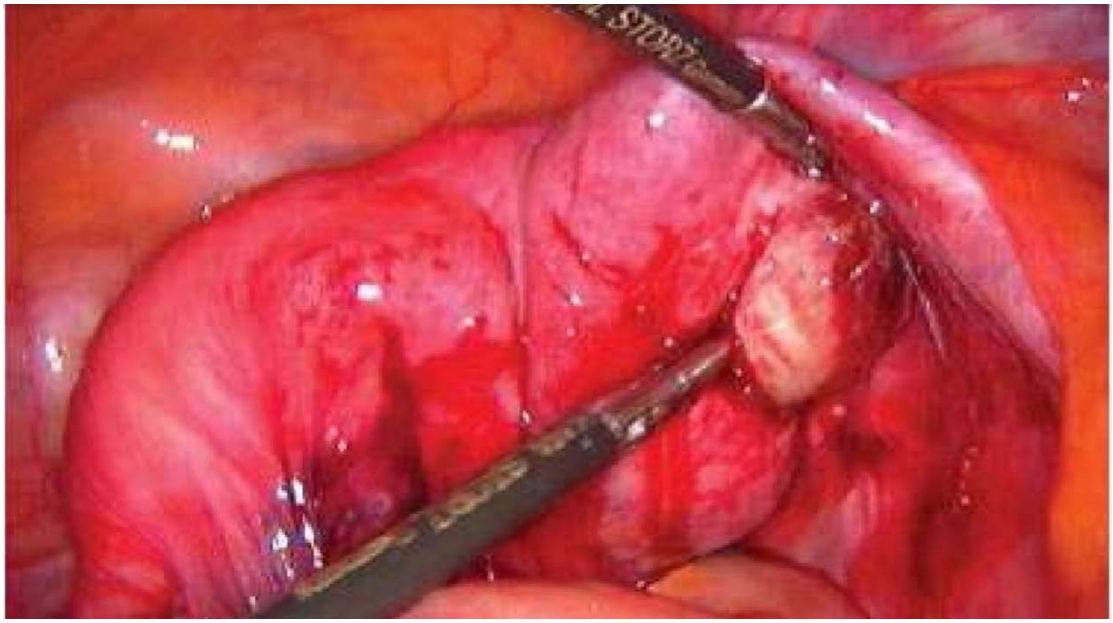
MECKEL'S DIVERTICULITIS



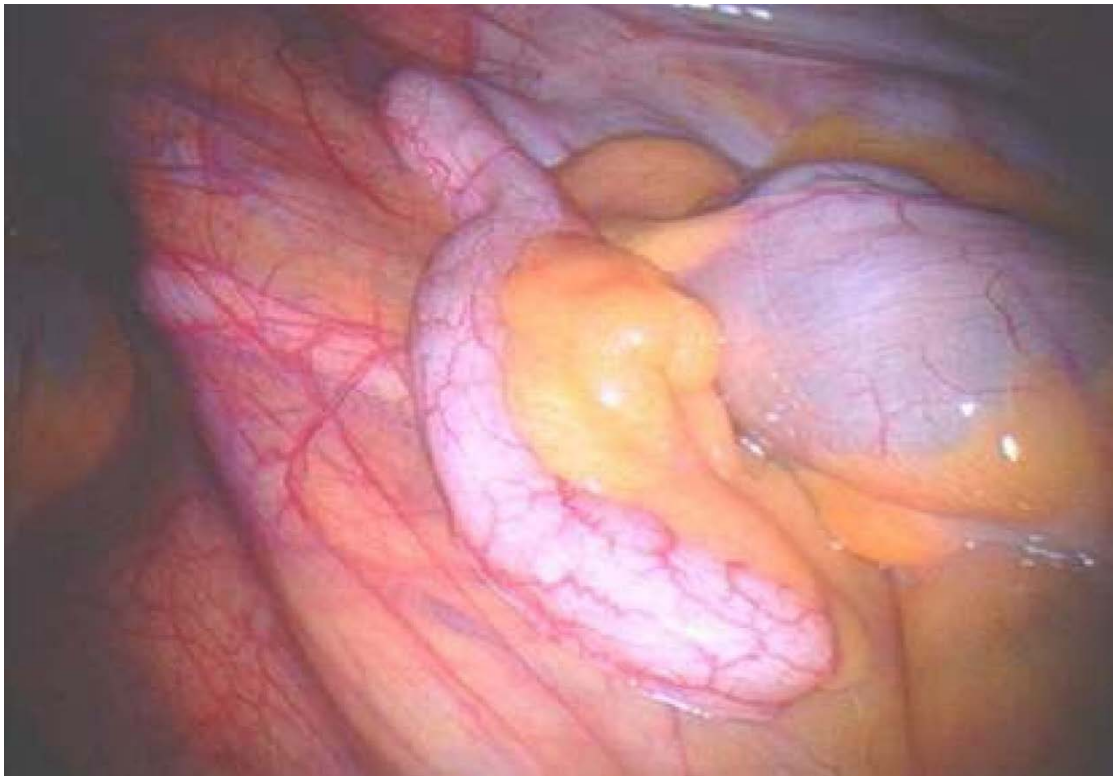
PERITONEAL TUBERCULOSIS



ENDOMETRIOSIS



OVARIAN CYST



NORMAL STUDY

DIAGNOSTIC LAPAROSCOPY

Laparoscopy is an operation performed in the abdomen or pelvis through small incisions with the aid of a camera. It aids in diagnosis or therapeutic interventions with a few small cuts in the abdomen. It has numerous advantages to the patient over an open procedure. Advantages include decreased pain due to smaller incisions, hemorrhaging and shorter recovery time.

It is also known as minimally invasive surgery, band aid surgery, or keyhole surgery. It is a modern surgical technique in which surgeries are performed through small incisions of size ranging from 0.5 to 1.5cm.

Advantages:

Reduced pain

Reduced bleeding

Shorter hospital stay

Shorter recovery time

The key element in this surgery is the use of a laparoscope which is a long fiber optic cable system which allows viewing of the affected area by connecting the cable from a more distant location.

Laparoscopic surgery involves operations within the abdominal or pelvic cavities. Keyhole surgery performed on the thoracic cavity or chest cavity is called thoracoscopic surgery.

There are two types of laparoscope

- A telescopic rod lens system. It is usually connected to a video camera.
- A digital laparoscope in which a miniature digital video camera is present at the end of the laparoscope.

The digital laparoscope is mainly used to improve the image quality of flexible endoscopes and it replaces traditional fiber scopes. However, laparoscopes are rigid endoscopes. It is required in clinical practice.

The rod-lens based laparoscopes are used overwhelmingly in practice, because of their fine optical resolution which is 50 μm typically and it is dependent on the aperture size that is used in the objective lens. The image quality is better than that of the digital camera.

Laparoscopic system also has a fiber optic cable system connected to a cold light source usually halogen or xenon. It is used to illuminate the operative field and it is inserted through a 5 mm or 10 mm cannula or trocar.

The abdomen is commonly insufflated with carbon dioxide gas which elevates the abdominal wall above the internal organs thus creating a working and viewing space. CO2 is used because it is common to the human body which can be absorbed by human tissue and also gets removed by the respiratory system. CO2 is also non-flammable.

This property is important because electrosurgical devices are commonly employed in laparoscopic procedures.

The laparoscopic approach is mainly intended to minimize post-operative pain and speed up recovery while maintaining an enhanced visual field for surgeons during surgery. In the last two decades, laparoscopic surgery has been adopted by various surgical sub-specialties due to improved patient outcomes.

Surgical sub specialities include gastrointestinal surgery, bariatric surgery, gynecologic surgery and urology.

Disadvantages of laparoscopic surgery includes the restricted vision, the difficulty in handling of the instruments because of lack of hand eye coordination, the lack of tactile perception and the limited working area.

Evolution in laparoscopic instrumentation and introduction of therapeutic laparoscopy has revived the benefits of diagnostic laparoscopy.

With the advent of modern instrumentations such as laparoscopic ultrasonography and biopsy forceps, the role of diagnostic laparoscopy is redefined. It has proved its diagnostic yield and safety.

Diagnostic laparoscopy should not replace the pre operative workup and all patients should be carefully evaluated with ultrasonography and computed tomography scanning.

OPERATING ROOM SET-UP:

The proper hardware and instruments are important for doing a safe laparoscopic surgery. Most large medical centers have dedicated interventional laparoscopic operating theatres.

Centres should have sufficient back up of instrumentation to cover for any equipment failure. Surgeons frequently change the position of the patient so as to enhance exposure and visualization. In laparoscopic bariatric procedures, the weight limit of the operating room table must be checked.

LAPAROSCOPIC INSTRUMENTION

1. Optical Devices
2. Equipment for creating / maintaining domain
3. Instruments for Access
4. Operative instruments
5. Energy sources
6. Tissue approximation/ hemostasis
7. Miscellaneous

1. Optical Devices

Telescope:

This telescope is made of surgical stainless steel. It contains an optical lens train consists of precisely aligned glass lenses and spacers. This is known as rod lens system.

It has the objective lens, which is present at the distal tip of the rigid endoscope and it determines the viewing angle. The light post is present at right angles to the shaft, allowing the attachment of the light cable to the telescope.

The eyepiece or the ocular lens is present outside the patient's body. It attaches to a camera to view the images on a video monitor.

Telescopes or laparoscopes has various sizes namely 10mm , 5mm, 2-3mm needle scopes.

Telescopes have visualization capabilities such as zero degree forward viewing, 30 or 45degree viewing telescope, zero degree telescope with 6mm instrument channel.

Light source:

White light illumination is delivered by a high-intensity xenon, mercury, or halogen lamp. It is delivered by a fiber optic bundle.

Light cable:

Light is transmitted from the lamp to the telescope with the help of cables.

There are two types of cables:

Fiberoptic

Fluid

Fiber optic cables are flexible. They do not transmit a precise light spectrum. Fluid cables can transmit more light. They transmit a complete spectrum of light. They are more rigid compared to the fiber optic cables. Fluid cables is sterilized by soaking and not by gas sterilization.

Video Camera:

Laparoscopic cameras have the solid state silicon computer chip or charge-coupled device. This chip or the charge coupled device functions as an electronic retina.

It comprises of an array of light-sensitive silicon elements. Silicon, when exposed to light, emits an electrical charge. These electrical charges can then be amplified, transmitted, displayed, and recorded. Each silicon element contributes one unit (a pixel) to the total image.

The resolution or clarity of the image is determined by the number of pixels or light receptors present on the chip.

Standard cameras used in laparoscopic surgeries contain 250,000 to 380,000 pixels. The single chip camera system has a composite transmission implying that the three colors, red, blue and green are compressed on a single chip.

The three chip camera system contains a separate chip for each color for higher resolution. The clarity of the image depends on the resolution capability of the monitor and the recording medium.

Standard consumer-grade video monitors have 350 lines of horizontal resolution. Laparoscopic surgery uses monitors having 700 lines of horizontal resolution.

Television Monitor:

High-resolution video monitors are necessary for the suitable reproduction of endoscopic image. The resolution capability of the monitor should match the resolution capability of the video camera. Three chip cameras system requires monitors having 700 lines of horizontal resolution to appreciate the improved resolution of extra chip sensors.

Equipment for Gas insufflation:

CO2 Insufflator:

The creation of working space within the abdominal cavity is generally by using carbon dioxide. It is delivered by an automatic, high flow, pressure regulated insufflator. Carbon di oxide is the preferred gas of choice.

Advantages of using carbondioxide include

Low risk of gas embolism

Low toxicity to peritoneal tissues

Rapid reabsorption

Low cost

Inhibits combustion.

The insufflator device delivers co2 at a flow rate of up to 20 liters / min. Insuffulator regulates the intra-abdominal pressure. It stops the delivery of CO2 when the intra abdominal pressure exceeds the predetermined level.

It is usually set at 12 to 15 mm Hg. It is kept at this level to reduce the risk of hypercarbia, acidosis and adverse hemodynamic and pulmonary effects that occur at higher pressure. This device has an alarm and it sounds when the pre-determined pressure limit is exceeded.

Nitrous oxide is not used because of unpredictable absorption characteristics and its ability to support combustion. Though helium gas is inert, it is not used because of significant risk of gas embolism.

Gasless laparoscopy:

Gasless laparoscopy has theoretical advantages in some high-risk patients with compromised cardio-respiratory function and decreased diaphragmatic splinting.

It allows continuous suction. Some conventional open instruments can also be used in gasless laparoscopy. Disadvantages are sub optimal exposure and localized trauma to the abdominal wall and parietal peritoneum.

Instruments for Access:

Veress needle- closed method:

The Veress needle is used to create pneumo peritoneum in closed method prior to the insertion of trocar. It has an outer sharp cutting needle and inner blunt spring-loaded obturator.

Resistance offered by the fascia, during insertion of the veress needle into the peritoneal cavity, causes the blunt tip to retract backwards thus enabling the penetration by the sharp outer needle.

The blunt stylet springs forward beyond the cutting edge when the cutting edge penetrates freely into the peritoneal cavity to prevent injury to the intraperitoneal structures.

The inner stylet is hollow and it has a side hole near its tip which allows for air insufflation.

Open access trocars:

Hasson's cannula:

The Hasson's cannula uses an open cutdown technique. Hasson's cannula has a conical blunt tip which is fitted into the cut down site. Hasson's cannula is buttressed in place with fascial sutures which are attached to the wings of the cannula.

Optical trocar:

It allows visualization of the abdominal tissues when the blade cuts through the abdominal wall in layers.

Operative Instruments

Trocars:

Laparoscopic port has an outer hollow sheath or cannula. Cannula has a valve to prevent the escape of CO2 gas and a side port for insuffulation of gas. Inner removable trocar goes through the outer sheath.

Trocars are available in various diameters and sizes and the most commonly used trocars are 10mm and 5 mm being trocars. Disposable trocars are also available and are equipped with safety shields.

Retraction

Exposure may be achieved by the following namely

Pneumoperitoneum

Gravity i.e. tilting the table

Instruments for retraction.

Instrumental retraction:

Large grasping instruments are used for retraction of the tissues.. Specifically designed fan-shaped retractors are used for liver retraction.

Mechanical Dissecting instruments:

Laparoscopic instruments are mostly 30 to 40 cm in length with a shaft diameter of 3 to 10mm. Shafts of those instruments are insulated with non-conductive material. The working tip is metallic to allow diathermy through coagulation adapters. Most laparoscopic instruments which have atraumatic tips. They have the mechanism to rotate 360 degrees for optimal adjustment of the instruments.

Forceps:

Grasping forceps are used for holding tissues and to achieve haemostasis and dissection. Dissecting forceps can be straight or curved with blunt tips.

Roticulators are instruments that can articulate to about 80 degrees in areas which are not easily reached. Grasping instruments come with either atraumatic or toothed jaws.

These instruments have a ratchet mechanism on their handles for locking onto the tissues to prevent fatigue when the surgeon is holding tissues for a long time.

Bowel and lung clamps:

Tubular structures, bowel and lung can be held gently with instruments designed specifically for the same namely Endo Babcocks, Endo-Lung and Bowel Clamp.

Scissors:

Scissors can be used for dissecting, mobilizing and cutting tissues, which include straight and curved types. Dissecting scissors have adapters for diathermy. Hook scissors must always be kept in view while entering and exiting as it damage the structures easily.

Energy Sources

Electrosurgery:

Electrocautery refers to usage of direct current (electrons flowing in one direction) whereas electrosurgery uses alternating current.

In electrocautery, the current does not enter the patient's body. Only the wire which gets heated comes in contact with tissue.

In electrosurgery, the patient is included in the circuit and current enters the patient's body.

The electrosurgical generator is the source of the electron flow and voltage. The circuit consists of the following

- Generator
- active electrode
- patient
- return electrode.

Grounding pathways can be achieved either by using the OR table, stirrups or equipment. The patient's tissue provides the impedance which produces heat. Nerve and muscle stimulation cease at 100,000 cycles/second and so the electrosurgery can be performed safely at frequencies well above 100 kHz.

An electrosurgical generator takes 60 cycles current and amplifies it to over 300,000 cycles per second. This frequency causes minimal neuromuscular stimulation and it has no risk of electrocution.

Bipolar:

In bipolar, both the active electrode and return electrodes are present at the site of surgery. The tips of the forceps perform the active and return electrode functions. Only the tissue grasped at the site of surgery is included in the circuit.

Monopolar:

In monopolar the active electrode is present in the wound. The patient return electrode is attached on the patient. In this circuit, the

current must flow through the patient to the patient return electrode to complete the circuit.

There are four components to the monopolar circuit:

Generator

Active Electrode

Patient

Patient Return Electrode

Electrosurgical generators can generate constant and intermittent electrical waveforms. Constant waveform is used for cutting and intermittent waveform is used for coagulation. This interrupted waveform will produce less heat. Instead of tissue vaporization occurring in cutting, a coagulum is produced while coagulating the tissues.

Direct Coupling:

Direct coupling occurs when the surgeon accidentally activates the generator when an active electrode is present near another metal instrument.

The secondary instrument will become energized. This energy seeks a pathway to complete the circuit to the patient return electrode resulting in significant patient injury.

Insulation Failure:

Coagulation waveform uses high voltage. This voltage or “push” can spark through compromised insulation and can also “blow holes” in weak insulation. Breaks in insulation can create an alternate route for the current to flow. If this current is concentrated, it can cause significant injury.

Capacitive Coupling:

Capacitor occurs whenever a nonconductor separates two conductors. During laparoscopy, an “ inadvertent capacitor” maybe created by the surgical instruments.

The conductive active electrode is surrounded by nonconductive insulation which is in turn surrounded by a conductive metal cannula. A capacitor creates an electrostatic field between the two conductors.

As a result, current in one conductor can induce a current in the second conductor through the electrostatic field.

Most potential problems can be avoided by following:

Inspect insulation carefully

Use lowest possible power setting

Use a low voltage waveform (cut)

Use brief intermittent activation vs. prolonged activation

Do not activate in close proximity or direct contact with another instrument

Use bipolar electrosurgery when appropriate

Select an all-metal cannula system

Do not use hybrid cannula systems

The electrosurgical unit should not be used in the presence of flammable agents (i.e., alcohol and/or tincture-based agents)

Avoid oxygen-enriched environments.

Always use an insulated safety holster to store active electrodes when not in use.

Argon-Enhanced Electrosurgery:

It uses a stream of argon gas to improve the effectiveness the electrosurgical current. Argon gas is inert.

It is noncombustible. Electrosurgical current easily ionizes argon gas and it makes the argon gas more conductive than air. This highly conductive stream of ionized gas provides the electrical current an efficient pathway.

Advantages

- Noncombustible
- Easily ionized by RF energy
- Creates bridge between electrode and tissue
- Heavier than air
- Displaces nitrogen and oxygen
- Inert

Ultrasonic Energy:

The Harmonic scalpel uses ultrasonic energy form. It allows both cutting and coagulation at the precise point of impact and it results in minimal lateral thermal damage to the tissues. It is used for cutting, coagulation and to achieve hemostasis.

Coagulation occurs by means of protein denaturation when the blade, vibrating at 55,500 Hz, couples with protein, denaturing it to form a coagulum that seals small vessels. Secondary heat is produced when the effect is prolonged which helps in sealing larger vessels.

It offers greater precision in tight spaces near vital structures. Fewer instrument changes are needed, less tissue charring and desiccation occur, and visibility in the surgical field is improved.

Cutting speed and coagulation are inversely related. With ultrasound technology, the balance between cutting and coagulation is in the hands of the surgeon.

Laparoscopic ligating suture delivery system:

A Pre-tied sliding knot with a loop is available with nylon carrier rod to ligate stump like structures or tubular structures after cutting. The push rod and suture loop are inserted laparoscopically via a hollow reducing sleeve; the suture is then looped around the structure to be ligated and the knot is slid down to close the loop. They are useful in appendicectomy.

Needle drivers:

A number of laparoscopic needle holders are available for laparoscopic suturing with either spring loaded or ratcheted –handle mechanisms. Endo stich is a 10mm disposable suturing device.

The needle features a sharp tapering point at each end with suture attachment at the center of the needle. The double-ended needle is passed between the two jaws of the suturing device.

Advantages include easy introduction, atraumatic needle manipulation, good security and easy accurate needle placement.

Disadvantage is that it is difficult to manipulate the thickness of tissue through with needle passes.

Clip Applicators:

Clip appliers are used for ligating blood vessels and other tubular structures. Disposable clip appliers contain up to 20 clips, whereas reusable clip appliers carry one clip at a time. Clips are made of titanium though now absorbable clips are also available.

Mechanical Stapling Instruments:

Laparoscopic staplers are modifications of open surgical staplers. Staplers are used for transecting and anastomosing bowel, transecting mesentery etc.

Multifire Endo GIA:

The instrument‘s knife cuts between two triple staggered rows of staples. TA instrument differs from GIA as it only staples and doesn’t cut. A range of staple lengths (2.5-3.8mm)is available depending on the thickness of the tissue to be divided.

Miscellaneous Aspiration / Irrigation probes:

These are essential for laparoscopic procedures in order to maintain a clear operative field. Irrigation and aspiration channels may be incorporated into surgical instruments.

Hand Assisted Laparoscopic surgery:

The Hand Access Device is intended to provide extracorporeal extension of pneumoperitoneum and abdominal access for the surgeon during laparoscopic surgery.

It is used in surgeries where entry of the surgeon's hand may facilitate the procedure. It is also used for extraction of large specimens.

Organ Extraction devices:

Endo-Catch:

These are pre loaded specimen retrieval pouches made of strong material. This material is impervious to cancer cells. The mouth of the pouch is bought out of the incision site and opened following which the specimen is extracted. The pouch itself must not be pulled out against resistance at it may tear with undue force.

Tissue Morcellators:

These are used to reduce the size of the resected specimen prior to retrieval. It may render pathological examination more difficult.

Space creators:

Balloon dissector is a space dissectors which functions when saline or air instilled into the pre-shaped balloon inserted into the intended region. These are used for laparoscopic extraperitoneal surgery

eg hernia repair, endoscopic neck surgery, subfascial endoscopic ligation of perforators veins, retroperitoneal surgery, etc.

Contraindications:

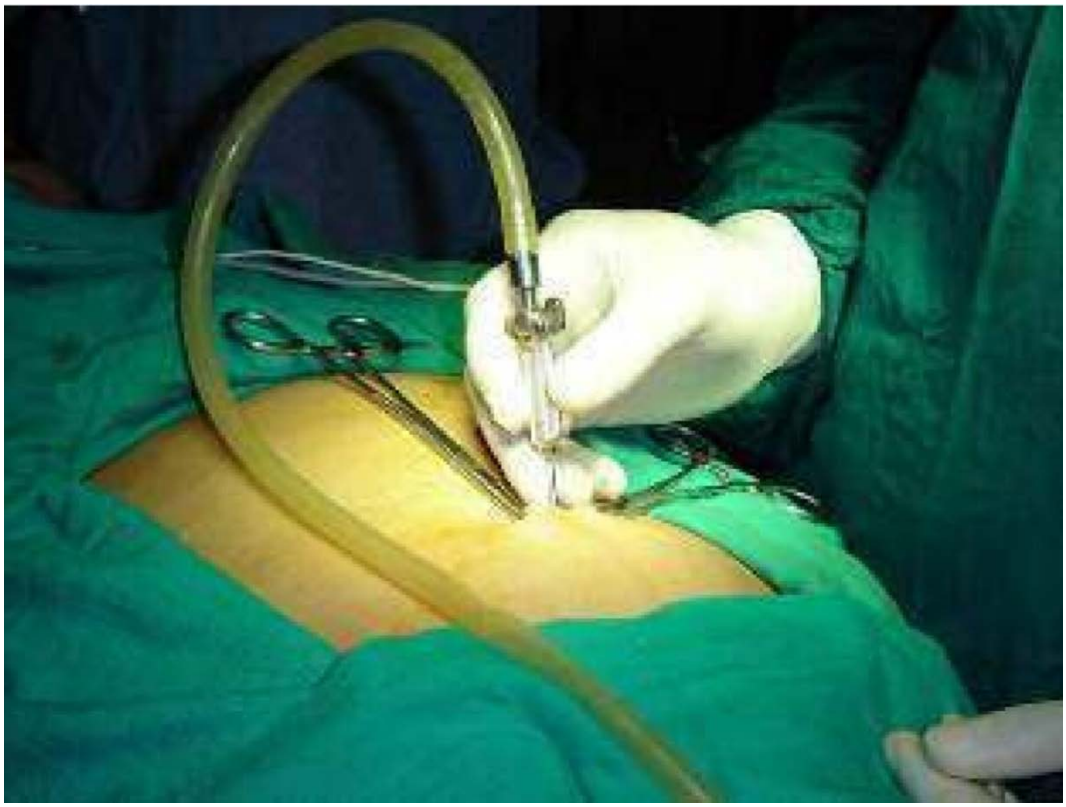
- Unstable cardio pulmonary status
- Coagulopathy
- Generalized peritonitis
- Acute bowel obstruction
- Abdominal wall infection

Relative contraindications:

- Chronic cardio pulmonary disorder
- Prior abdominal surgeries
- Abdominal hernias
- Obesity
- Tense ascites

Complications

- Emphysema
- Bowel perforation
- Localized pneumoperitoneum
- Bleeding gas embolism
- Mediastinal emphysema
- Major vessel injury



VERESS METHOD

HASSON'S METHOD

Laparoscope Instruments

Patient prepared and draped

Laparoscopic Unit

Trocar Sheath

Harmonic Scalpel

Fan Retractor

Endo Bag

Laparoscope and Light cable

MATERIALS AND METHODS

MATERIALS AND METHODS:

Source (study population):

The patients admitted in Govt. Kilpauk Medical College Hospital including Govt. Royapettah Hospitals, Chennai at Department of General Surgery who are having undiagnosed chronic lower abdominal pain.

Study period:

March 2018 to August 2018

INCLUSION CRITERIA :

- Patients with undiagnosed chronic lower abdominal pain for greater than 3 months duration.
- Patients with or without previous abdominal surgeries.
- Patients of both sexes.
- Patient of age group 18 to 65 years.

EXCLUSION CRITERIA

- Patients with established diagnosis after laboratory and radiological investigations.
- Patients with comorbid conditions.
- Patients with acute abdomen and peritonitis
- Patients with functional bowel diseases.

METHODOLOGY

In this study, patients with chronic lower abdominal pain for greater than 3 months are studied. Detailed history obtained from the patients including the previous abdominal surgeries. Data are collected in proforma. These patients are examined clinically.

Blood investigations such as complete blood count, renal function tests, liver function tests, urine routine and urine culture are done to find the cause of chronic lower abdominal pain.

If the cause is not diagnosed by above investigations then radiological imaging such as x ray, ultrasound abdomen and pelvis and CECT abdomen and pelvis are done in a sequential manner to find the cause. Additional investigations such as colonoscopy are done according to the patient symptoms.

If the cause is diagnosed at any point during the above mentioned investigations, the patients will be excluded from the study.

Only those patients who remain undiagnosed even after all these above mentioned investigations are incuded in the study. Patients with established diagnosis, co morbid conditions and acute peritonitis are excluded from the study.

A proforma will be used to record the socio-demographic data of the patients along with clinical findings, investigations, laparoscopic findings, diagnosis, and complications

All patients included for the study are informed about the rationale of using diagnostic laparoscopy to find the cause of undiagnosed chronic lower abdominal pain. Informed consent is obtained from patients who are willing to undergo diagnostic laparoscopy.

Pre operative preparation is done by anxiolytics, sedatives and bowel enema. Standard diagnostic laparoscopic procedure is undertaken. All the quadrants of the abdomen are visualized in a sequential manner. Solid organs, small bowel and large bowel are visualized and pathology if any is identified. Ovaries, fallopian tubes and uterus are examined for any pathology in female patients.

Appendix is visualized in all patients and if any pathology identified is managed accordingly. If possible, pathologies that can be treated by laparoscopy will be treated or managed accordingly.

Various conditions leading to chronic lower abdominal pain that are observed in the diagnostic laparoscopy are documented.

The diagnostic value of the laparoscopy is analyzed by assessing the proportion of cases in which the cause of the chronic lower abdominal pain gets identified. Further the percentage of the various causes leading to chronic lower abdominal pain are studied.

OBSERVATION AND DATA ANALYSIS

In this study, 85 patients with undiagnosed chronic lower abdominal pain are evaluated with diagnostic laparoscopy and the results are as follows:

TABLE 1: AGE DISTRIBUTION

S.NO	AGE DISTRIBUTION (in years)	NO. OF SUBJECTS	PERCENTAGE
1.	18-25	10	12%
2.	26-35	39	46%
3.	36-45	20	24%
4.	46-55	7	8%
5.	56-65	9	10%
	TOTAL	85	100%

It can be observed that out of 85 patients, 26 – 35 years age group patients accounted for 39 patients which accounted for about 46% of the patients.

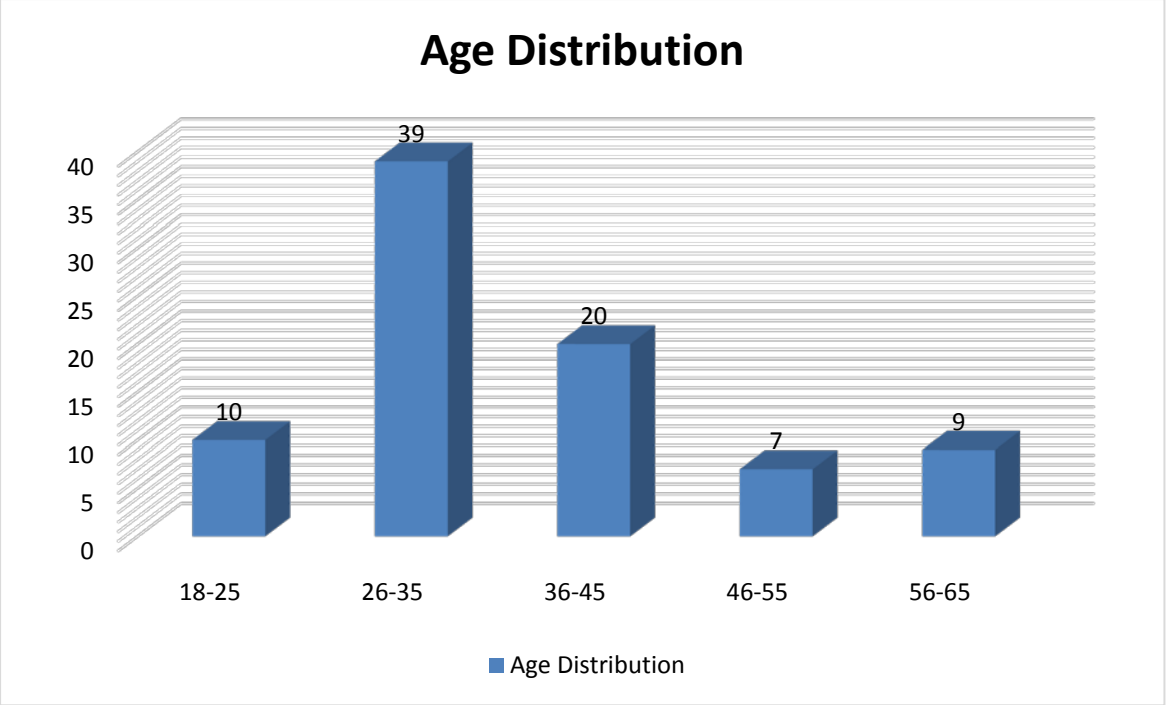
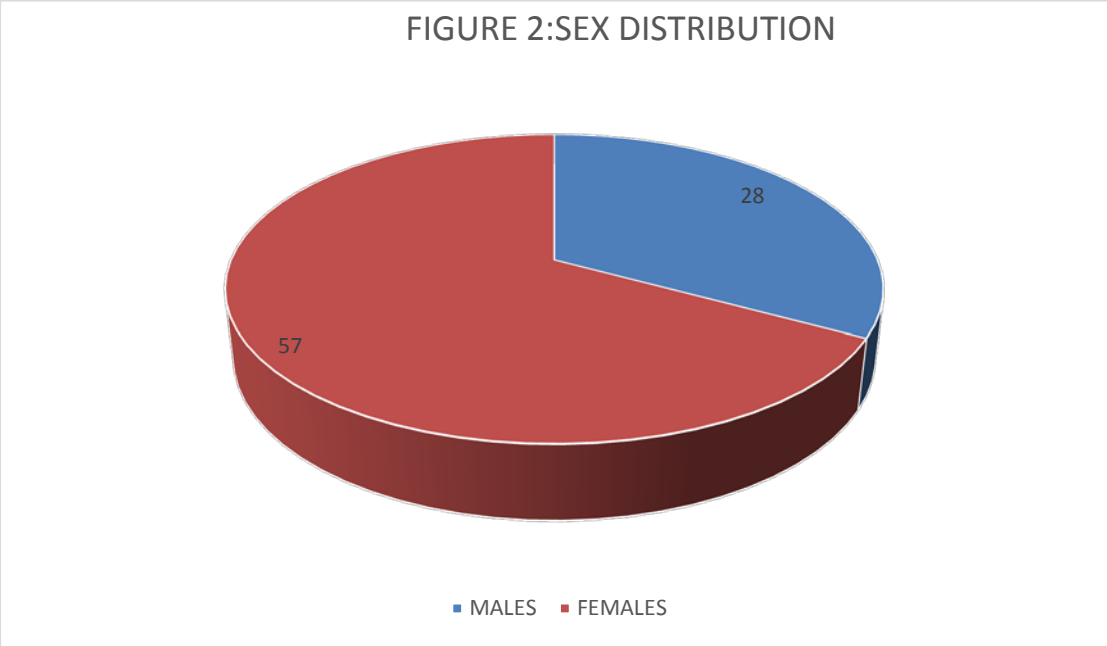


FIGURE 1: AGE DISTRIUTION AMONG STUDY SUBJECTS

TABLE NO: 2 SEX DISTRIBUTION

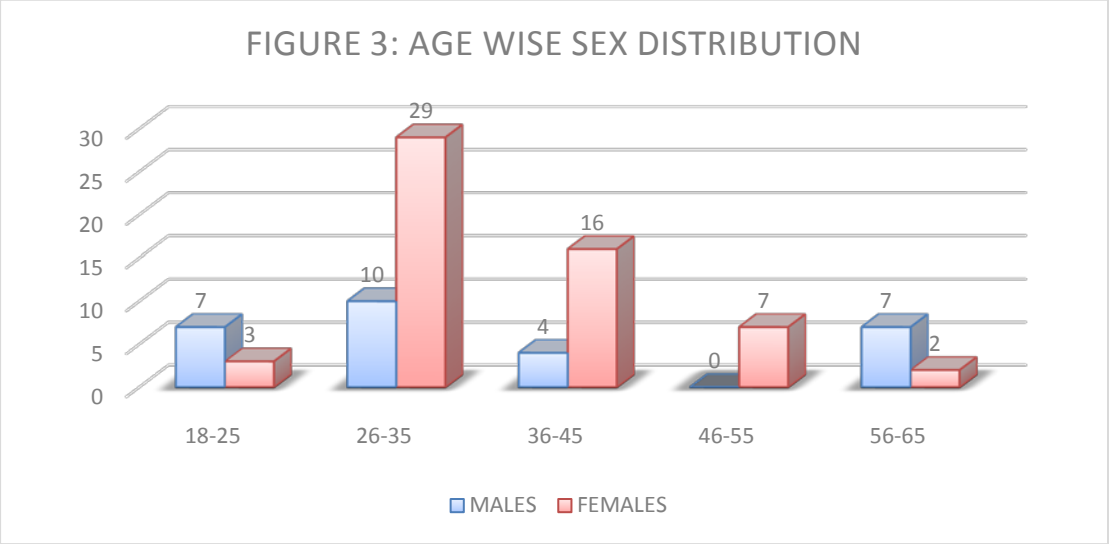
	NUMBER	PERCENTAGE
MALES	28	33
FEMALES	57	67
TOTAL	85	100



It can be observed that 57 out of 85 patients are females and account for about 67% and 28 out of 85 patients are males and account for about 33%.

TABLE 3: AGE WISE SEX DISTRIBUTION

S.NO	AGE (in years)	NO.OF MALES	PERCENTAGE	NO. OF FEMALES	PERCENTAGE
1.	18-25	7	8	3	3.5
2.	26-35	10	12	29	34
3.	36-45	4	5	16	19
4.	46-55	00	00	07	8
5.	56-65	07	8	2	2.5
	TOTAL	28	33	57	67



As observed above, 10 out of 28 male patients and 29 out of 58 female patients belonged to 26-36 years age group.

TABLE NO:4 ASSOCIATED SYMPTOMS

SYMPTOMS	MALES	FEMALES	TOTAL
NIL	7	8	15
NAUSEA	11	13	24
VOMITING	8	9	17
FEVER	14	5	19
WHITE DISCHARGE	00	5	05
BURNING MICTURITION	2	11	13
DYSMENORRHOEA	00	6	06
LOSS OF APPETITE	10	3	13
LOSS OF WEIGHT	11	4	15
ABDOMINAL DISTENTION	00	2	02
CONSTIPATION	00	4	04
CHILLS	00	3	03

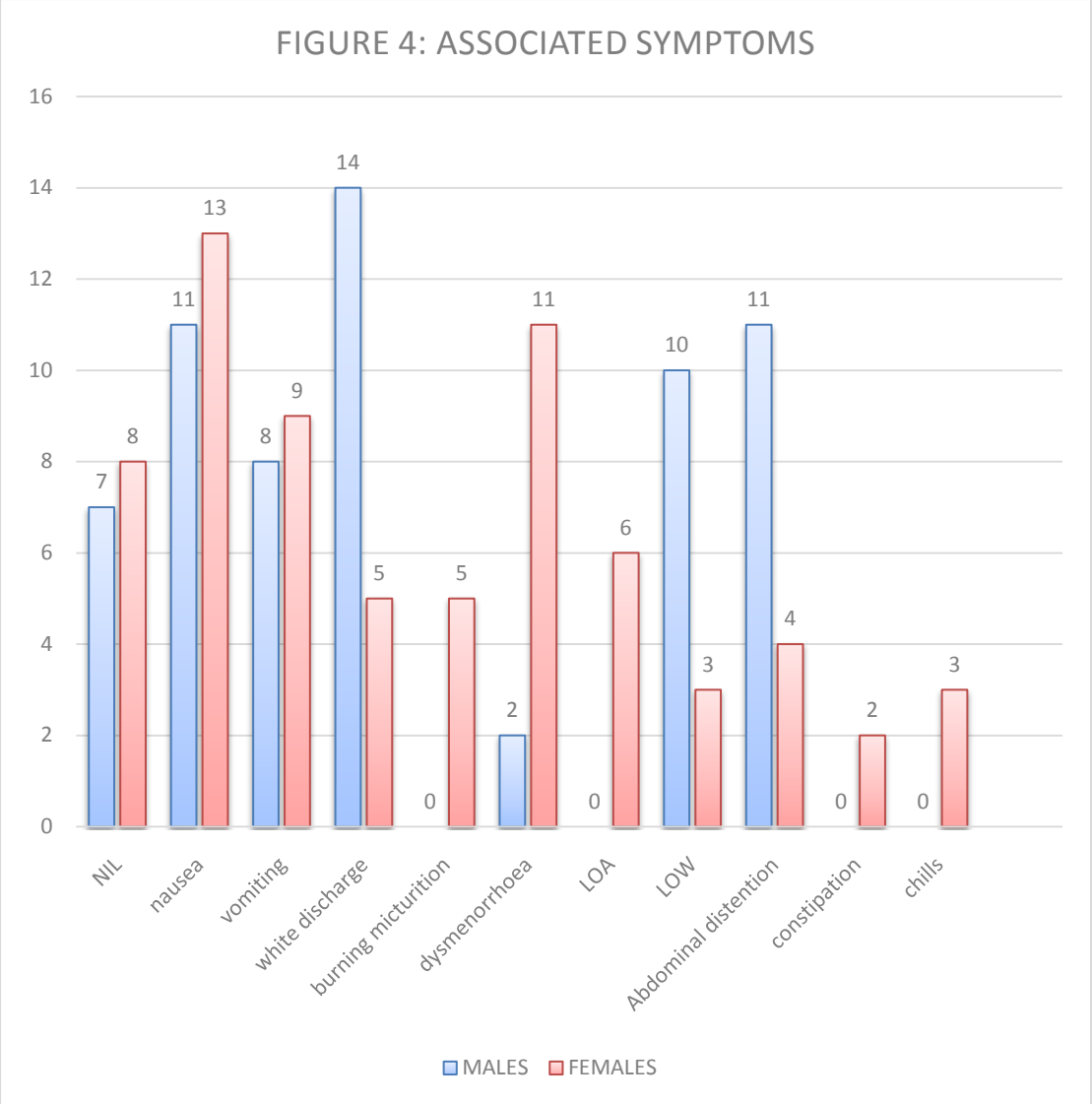


FIGURE 4: ASSOCIATED SYMPTOMS
16
14
12
10
8
6
4
2
0
7
8
11
13
8
9
14
5
0
5
2
11
0
6
10
3
11
4
0
2
0
3
NIL
nausea
vomiting
white discharge
burning micturition
dysmenorrhoea
LOA
LOW
Abdominal distention
constipation
chills
MALES
FEMALES

TABLE 5: DIAGNOSTIC LAPAROSCOPIC FINDINGS

FINDINGS	MALES	FEMALES	TOTAL	PERCENTAGE
Normal study	02	02	04	4.7
Subacute appendicitis	20	17	37	43.5
Adhesions	01	20	21	24.8
Mesenteric panniculitis	01	00	01	1.2
Adnexitis	00	02	02	2.3
Mesenteric lymphadenopathy	01	01	02	2.3
Ileocecal tuberculosis	01	00	01	1.2
Hydrosalphinx	00	04	04	4.7
Peritoneal tubercles	01	07	08	9.5
Ovarian cyst	00	02	02	2.3
Endometriosis	00	02	02	2.3
Meckel’s diverticulitis	01	00	01	1.2

Figure 5: Findings in diagnostic laparoscopy

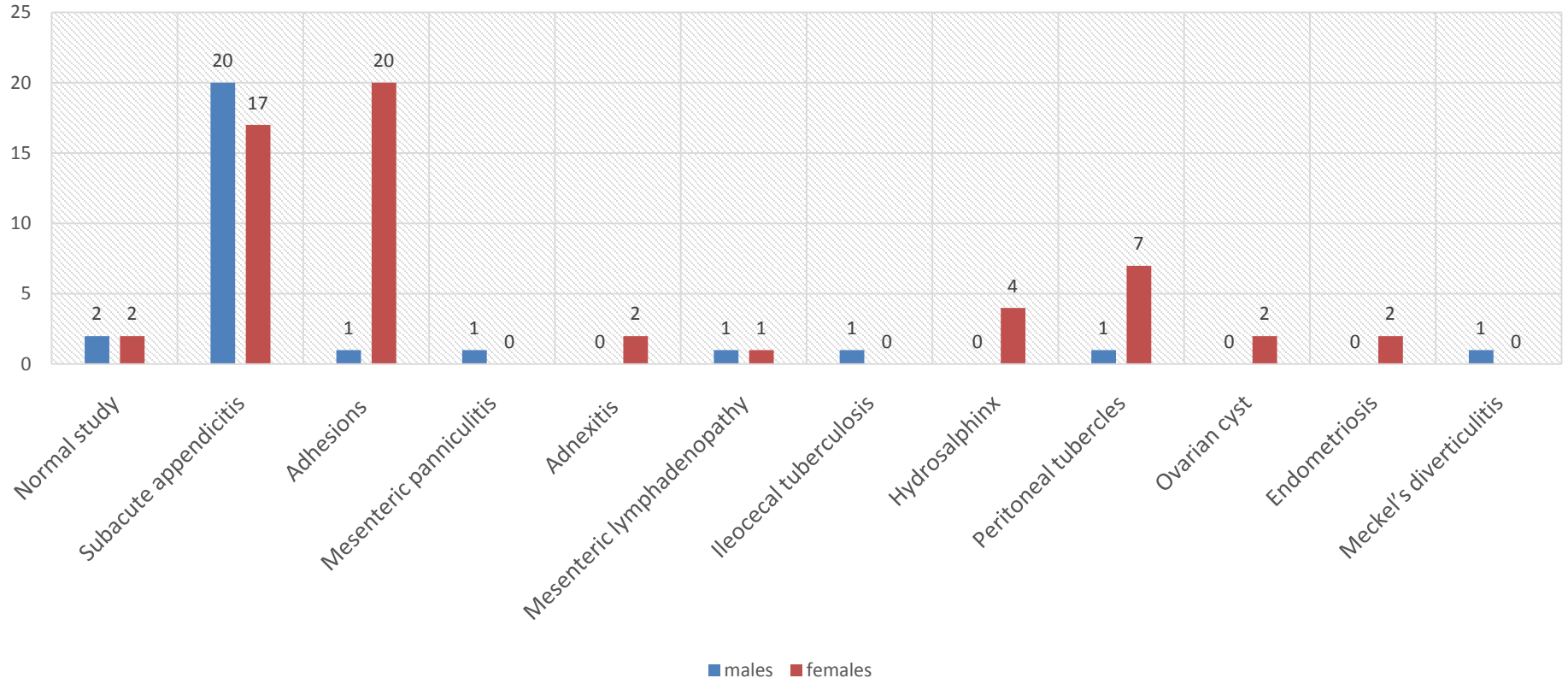


FIGURE 6: CAUSES OF CHRONIC LOWER ABDOMINAL PAIN

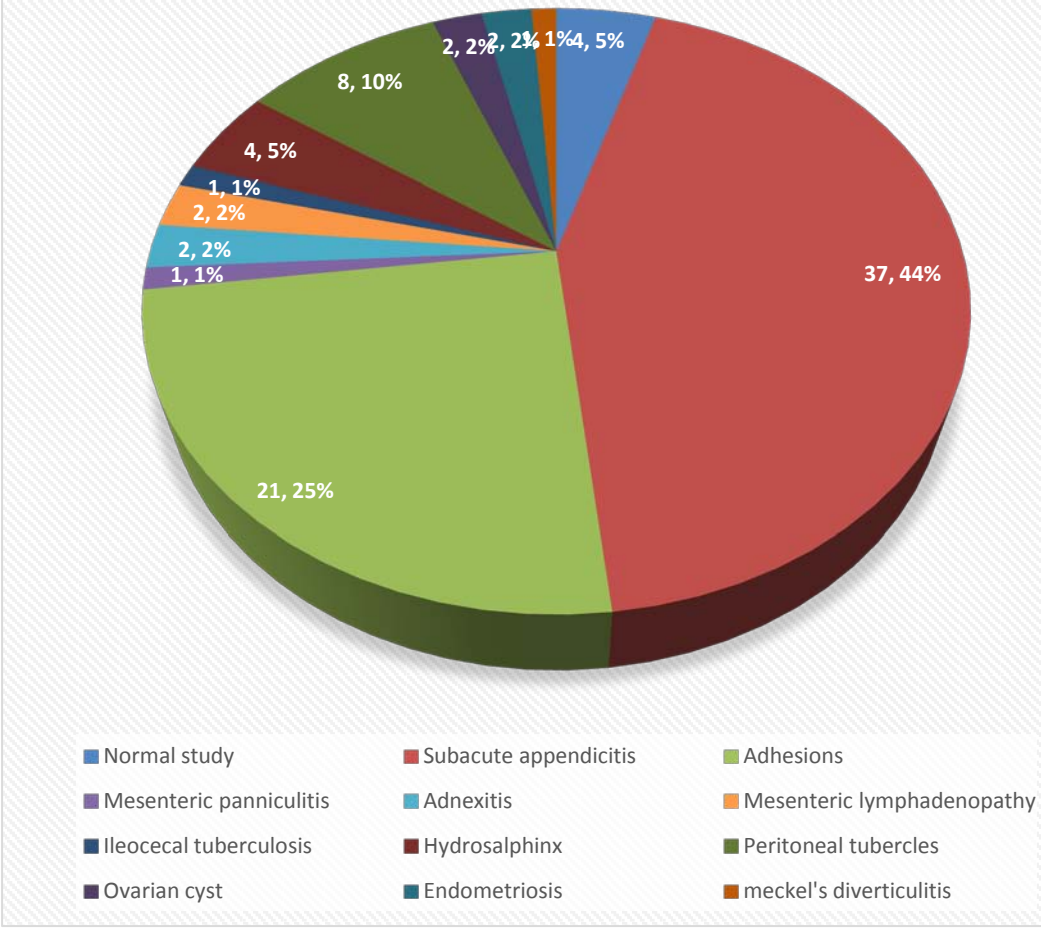


TABLE 6: SUBACUTE APPENDICITIS AGE DISTRIBUTION

Age in years	Sub acute appendicitis	Percentage
18-25	06	16.2
26-35	20	54
36-45	08	21.6
46-55	00	00
56-65	03	08.2

Figure 7: subacte appendicitis - age distribution

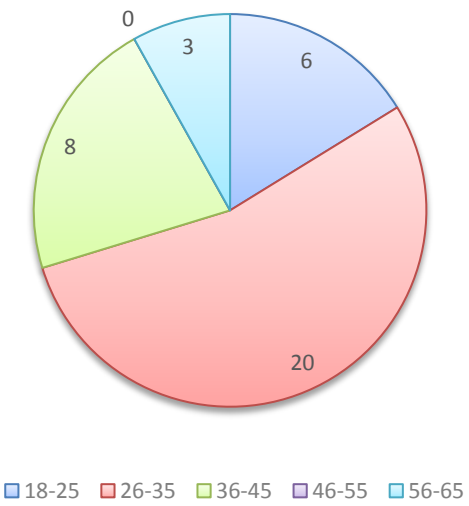


TABLE 7: ADHESIONS – AGE DISTRIBUTION

Age in years	ADHESIONS	PERCENTAGE
18-25	01	4.8
26-35	04	19
36-45	08	38
46-55	06	28.6
56-65	02	9.6

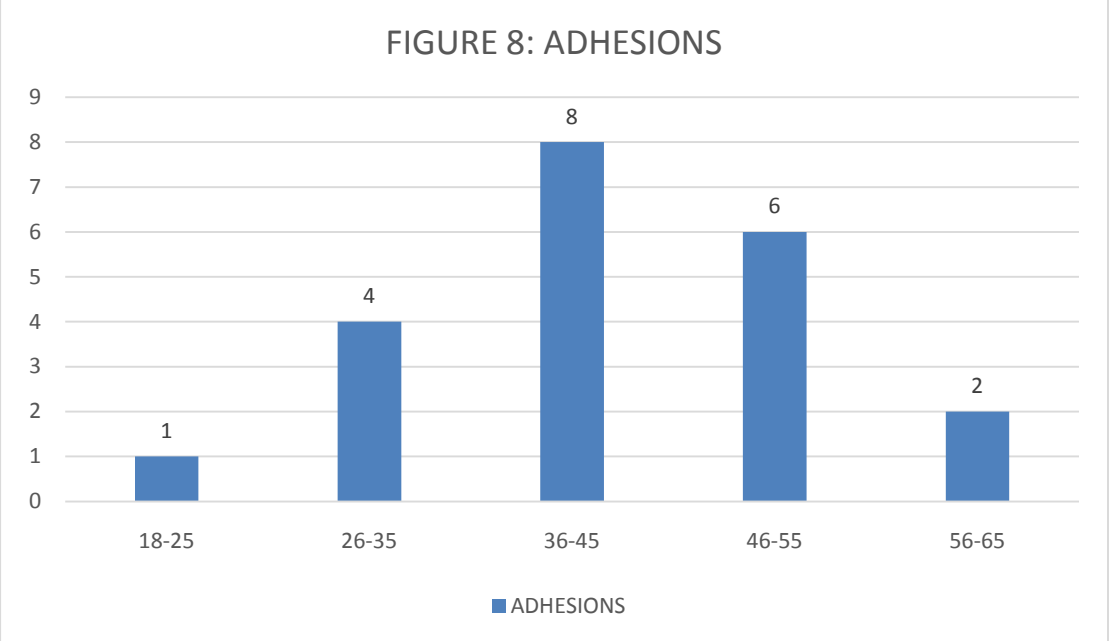


TABLE 8: PROCEDURES

PROCEDURE	MALES	FEMALES	TOTAL
Laparoscopic appendectomy	20	17	37
Laparoscopic adhesiolysis	01	20	21
Ablation	00	02	02
Biopsy	03	08	11
Nil	04	10	14

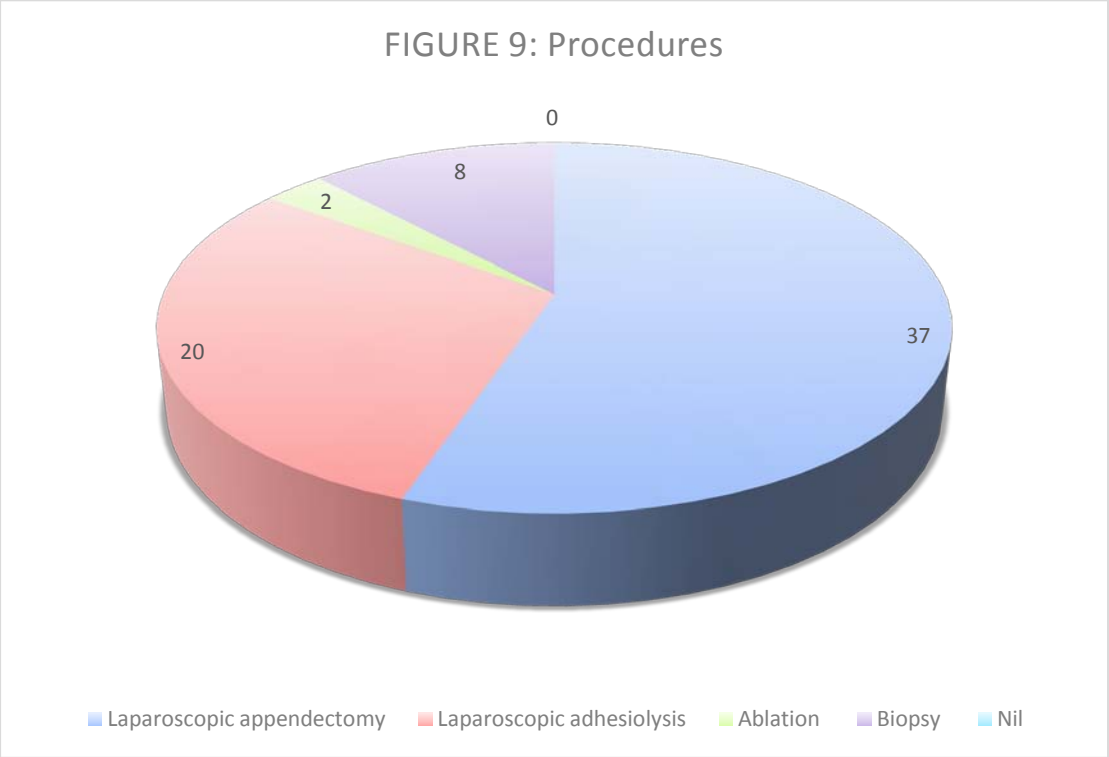
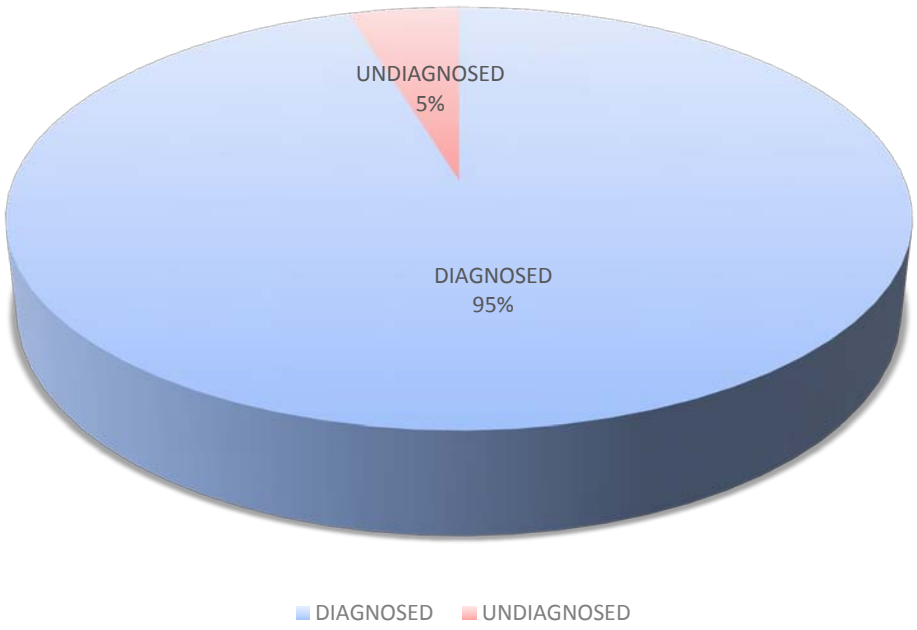


FIGURE 10: 0UTCOMES OF DIAGNOSTIC LAPAROSCOPY



RESULTS

In this observational study (A study on role of diagnostic laparoscopy in evaluation of chronic lower abdominal pain), 85 patients were analyzed.

There were 28 males and 57 females. Lowest and highest age of the patients included in the study was 18 and 6 respectively.

Patients with chronic lower abdominal pain had associated symptoms such as nausea, vomiting, fever, burning micturition, white discharge, loss of appetite, loss of weight, constipation, dysmenorrhea and abdominal distention. The most common associated symptom was nausea which was found in 24 patients.

The abnormal findings that were observed by diagnostic laparoscopy include sub acute appendicitis, adhesions, ileocecal tuberculosis, peritoneal tubercles, adnexitis, mesenteric adenitis, mesenteric panniculitis, hydrosalphinx, ovarian cyst, endometriosis and meckel’s diverticulitis.

Sub acute appendicitis was present in 37 patients which accounted for about 46% of patients. Out of 37 patients with sub acute appendicitis, 20 patients were males and 17 patients were females. Out of 37 patients with sub acute appendicitis 20 patients were in the 26-35 years age group.

In this study, adhesions were found in 21 patients in which 20 patients were females. 8 out of 21 patients belonged to the 36-45 years age group. Most of the female patients had previous abdominal surgeries such as lower segment caesarean section and or sterilization. Adhesions were most commonly found adhering to the scar over the anterior abdominal wall. All the 21 patients with adhesions were treated with laparoscopic adhesiolysis in the same sitting without any complications.

Peritoneal tubercles were observed in 8 patients in which 7 patients were females. Ileocecal tuberculosis was present in 1 patient. Biopsy was taken in all these patients and they were diagnosed to have abdominal tuberculosis. They are started on anti tubercular drugs.

Gynaecological problems were present in about 10 female patients. Out of 10 patients, 4 patients had hydrosalphinx, 2 patients had adnexitis, 2 patients had endometriosis and 2 patients had ovarian cysts.

Out of 57 female patients, only 10 patients had gynaecological pathologies. Majority of the female patients had non gynaecological problems like sub acute appendicitis, adhesions and peritoneal tubercles.

Out of 85 patients included in the study, 4 patients had normal study. Out of 4 patients, 2 were males and 2 were females.

Out of 85 patients with undiagnosed chronic lower abdominal pain, 81 patients had definitive diagnosis at the end of the procedure.

In this study, 60 patients had definitive therapeutic procedures which is about 70%. 11 patients had biopsy done. 71 out 85 patients had either definitive procedures or ancillary procedures done.

DISCUSSION

In this observational study, 85 patients were studied during the period of March 2018 to August 2018. It is observed that females underwent diagnostic laparoscopy more commonly when compared to female patients. The reason for increased incidence of chronic lower abdominal pain in female patients can be attributed to the additional gynaecological problems that occur in the female patients.

26-35 years age group patients were most commonly affected in our study. This can be attributed to the most commonly observed diagnoses in this study namely sub acute appendicitis and adhesions, which are usually seen in this reproductive age group.

Nausea is the most commonly associated symptom which is present in about 28 percent of the patients. It is because, sub acute appendicitis being the most common diagnosis, is usually associated with nausea.

Sub acute appendicitis is the most common finding which accounted for about 46 percent of the total findings. Males and females are equally affected with sub acute appendicitis.

Adhesions is the second most common finding observed after subacute appendicitis accounting for about 24 percent of the findings. It is

most commonly found in females. The female preponderance can be attributed to the lower abdominal surgeries done in females namely caesarian section and sterilization.

83 percent of the females had non gynaecological problems and 17 percent of the females had gynaecological problems.

About 5% of the patients had normal findings on diagnostic laparoscopy. Remaining 95 percent of the patients had their definite diagnosis at the end of the procedure. It shows the high diagnostic yield of using diagnostic laparoscopy in patients with undiagnosed chronic lower abdominal pain. Diagnostic laparoscopy is a boon to these patients as they tend to have more prolonged suffering as their condition mostly goes undiagnosed by other sophisticated imaging modalities.

84 percent of the patients had either therapeutic procedures or ancillary procedures performed on them. Most commonly performed procedure was laparoscopic appendectomy followed by laparoscopic adhesiolysis and biopsy.

In this study, it was observed that diagnostic laparoscopy has high diagnostic yield in patients with undiagnosed lower abdominal pain in which the imaging modalities such as ultrasonogram and computed tomography fails to identify any definitive pathology.

Diagnostic laparoscopy is not a substitute for clinical examination. All patients should be examined thoroughly and investigated with non invasive imaging modalities such as ultrasonogram and computed tomography to find the cause. The patients who remain undiagnosed even after these investigations were included in the study.

Diagnostic laparoscopy is a valuable tool and when used judiciously it has a high diagnostic yield. It also has an added advantage of performing therapeutic procedures at the same sitting if a treatable pathology is identified during diagnostic laparoscopy.

In a study conducted with 100 patients by Abhay kumar et al, adhesions was the most commonly observed finding accounting for about 30%.

In a study conducted with 88 patients by Ahmad MM et al, 85 percent patients had definitive diagnosis at the end of the procedure. Most common laparoscopic finding was appendicitis.

In a study conducted with 55 patients by Sayed et al, 49 patients accounting for about 89 percent had definitive diagnosis and the most common finding was adhesions accounting for about 38 percent.

Talat N et al conducted a study which had positive findings in 45 patients out of 50 patients included in the study.

Arya K et al conducted a study on using laparoscopy as a diagnostic tool for lower abdominal pain which yielded positive findings in 44 patients out of 49 patients which accounts for about 89percent. Appendicitis, abdominal tuberculosis and gynaecological pathologies were the common findings.

In a study conducted by Raymond onders et el, 39 patients out of 70 had adhesions as cause for chronic abdominal pain.

CONCLUSION

In this observational study that has been conducted for 6 months from March 2018 to August 2018, the use of laparoscopy as a diagnostic and therapeutic tool in patients with chronic lower abdominal pain was studied. The blood and radiological investigations namely ultrasonogram and computed tomographic studies were inconclusive in those patients.

In patients presented with chronic lower abdominal pain, ninety five percent of them had a definitive diagnosis at the end of the procedure suggesting that diagnostic laparoscopy has a high yield in this group of patients.

So, laparoscopy can be used in patients with non specific abdominal pain that is diagnosed by other methods.

Laparoscopic has a high diagnostic yield in women of child bearing age because of the associated gynaecological problems. Unnecessary radiation exposure can be avoided in these patients.

It has therapeutic role in eighty four percent of the patients. Diagnosis and treatment can be done at the same sitting.

Diagnostic laparoscopy is very much useful in diagnosing and treating the patients with undiagnosed chronic lower abdominal pain.

BIBLIOGRAPHY

1. McGarrity TJ, Peters DJ, Thompson C, McGarrity SJ. Outcome of patients with chronic abdominal pain referred to chronic pain clinic. Am J Gastroenterol 2000;95:1812-6

2. Paajanen H, Julkunen K, Waris H. Laparoscopy in chronic abdominal pain: A prospective nonrandomized long-term follow-up study. J ClinGastroenterol 2005;39:110-4

3. Peters AA, Van den Tillaart SA. The difficult patient in gastroenterology: Chronic pelvic pain, adhesions, and sub occlusive episodes. Best Pract Res ClinGastroenterol 2007;21: 445-63.

4. van Goor H. Consequences and complications of peritoneal adhesions.Colorectal Dis 2007;9:25-34

5. Bohner H, Yang Q, Franke K, Ohmann C: Significance of anamnesis sand clinical findings for diagnosis of acute appendicitis. Acute Abdominal Pain Study Group. Z Gastroenterol 1994; 32: 579–836.

6. JA Fayez, NJ Toy, TM Flanagan : The appendix as the cause of chronic lower abdominal pain- American Journal of Obstetrics & …, 1995; 172(1);122-3

7. Andersson REB: Meta-analysis of the clinical and laboratory diagnosis of appendicits. British J Surg 2004; 91: 28–37.

8. Fox JC, Hunt MJ, Zlidenny AM, et al. A retrospective analysis of emergency department ultrasound for acute appendicitis. *West JEmerg Med.* 2007;8:article 2.

9. Purysko AS, Remer EM, et al. Beyond appendicitis: common and uncommon gastrointestinal causes of right lower quadrant abdominal pain at multidetector CT. Radiographics.2011 Jul-Aug;31(4):927-47

10. Ikard RW. There is no current indication for laparoscopic adhesiolysis to treat abdominal pain. South Med J 1992;85:939-40.

11. Miller K, Mayer E, Moritz E. The role of laparoscopy in chronic and recurrent abdominal pain. Am J Surg 1996;172:353-6.

12. Moussa GI, Mahfouz AE. Role of laparoscopy in the management of unexplained chronic abdominal pain. Egypt J Surg 2004;23:22.

13. El-Labban GM, Hokkam EN. The efficacy of laparoscopy in the diagnosis and management of chronic abdominal pain. J Minim Access Surg 2010;6:95-9

14. Salky BA, Edye MB. The role of laparoscopy in the diagnosis and treatment of abdominal pain syndromes. SurgEndosc 1998;12: 911-4

15. Sayed ZK, Verma RA, Madhukar KP, Vaishampayan AR, Kowli MS, Vaja C. Role of Diagnostic Laparoscopy in Chronic Abdominal Pain. Int J Sci Stud 2015;3(4):31-35.

16. Larsson PG, Henriksson G, Olsson M, et al. Laparoscopy reduces unnecessary appendicectomies and improves diagnosis in fertile women. A randomized study. SurgEndosc 2001; 15:200-2.

17. Schren P, Rieger R, Shamiyeh A, WayandW .Diagnostic laparoscopy through the right lower abdominal incision following open appendectomy. SurgEndosc. 1999 Feb;13(2):133-5.

18. Galili O, Shaoul R, Mogilner J. Treatment of chronic recurrent abdominal pain: Laparoscopy or hypnosis? J Laparoendosc AdvSurg Tech A 2009;19:93-6.

19. Camilleri M. Management of patients with chronic abdominal pain in clinical practice. NeurogastroenterolMotil 2006;18:499-506

20. Abhay Kumar, M YousufSarwar, NawalKishor Pandey. “Role of diagnostic laparoscopy in nonspecific chronic abdominal pain: experience of 100 cases”. Journal of Evolution of Medical and

Dental Sciences 2013; Vol2, Issue 48, December 02; Page: 9361-9366.

21. Ahmad MM, Dar HM, Waseem M, Wani H, Nazir I, Jeelani A. Role of laparoscopy in nonspecific abdominal pain. Saudi Surg J 2014;2:71-4

22. Sayed ZK, Verma RA, Madhukar KP, Vaishampayan AR, Kowli MS, Vaja C. Role of Diagnostic Laparoscopy in Chronic Abdominal Pain. Int J Sci Stud 2015;3(4):31-35.

23. Talat N, Afzal M, Ahmad S, Rasool N, Wasti AR, Saleem M.ROLE OF DIAGNOSTIC LAPAROSCOPY IN EVALUATION AND TREATMENT OF CHRONIC ABDOMINAL PAIN IN CHILDREN. 2016 Jan-Mar;28(1):35-8

24. Arya PK, Gaur KJ. Laparoscopy: A tool in the diagnosis of lower abdominal pain. Indian J Surg 2004;66:216-20

25. Onders RP, Mittendorf EA. Utility of laparoscopy in chronic abdominal pain. Surgery2003;134:549-52.

ANNEXURE

MASTER CHART

s.no	Name	Age	Sex	Associated symptoms	Ultrasound report	CT report	Diagnostic laparoscopy findings	Procedure
1	Vinay	33	M	Vomiting, fever	Normal study	Normal study	Sub acute appendicitis	Laproscopic appendectomy
2	Gopi	18	M	nil	Probetenderness	Normal study	Normal study	Nil
3	Meghna	22	F	White discharge pv	Normal study	Free fluid in pelvis	Sub acute appendicitis	Laproscopic appendectomy
4	Arokiyamary	55	F	Burning micturition	Free fluid in pelvis	Normal study	Adhesions	Laparosccpicadhesiolysis
5	Suganya	30	F	Vomiting white discharge pv	Free fluid in right iliac fossa	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
6	Malar	32	F	Burning micturition, white discharge pv	Free fluid in pelvis	Normal study	Adhesions	Laparoscopic adhesiolysis
7	Palani	23	M	Vomiting, fever	Normal study	Mesenteric adenopathy	Mesenteric panniculitis	Biopsy
8	Selvi	28	F	Nausea	Appendix not visualised	Free fluid in pelvis	Sub acute appendicitis	Laparoscopic appendectomy
9	Thilagavathy	24	F	Nausea burning micturition	Cecal wall thickening	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
10	Mary	36	F	Nausea dysmenorrhoea	Free fluid in pelvis	Normal study	Adnexitis	Nil
11	Saravanan	33	M	Nausea	Normal study	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
12	Yamuna	28	F	Vomiting burning micturition	Appendix not visualised	Normal study	Mesenteric adenitis	Biopsy
13	Balakumaran	18	M	Fever, LOA, LOW	Ileocecal thickening	Free fluid in RIF	Ileocecal tuberculosis	Biopsy
14	Devi	26	F	Fever, burning micturition	Free fluid in pelvis	Normal study	Hydrosalphinx	Nil
15	Shanmugapriya	40	F	Nil	Normal study	Normal study	Adhesions	Laparoscopic adhesiolysis
16	Aswana	34	F	Vomiting abdominal distention	Normal study	Normal study	Adhesions	Laparoscopic adhesiolysis
17	Abirami	34	F	Nausea	Appendix not visualised	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
18	Gokul	38	M	Vomiting, fever	Probe tenderness	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
19	Raghu	28	M	Nil	Free fluid in RIF	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
20	Dharshini	26	F	Nausea LOA, LOW	Cecal thickening	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
21	Deepa	30	F	Burning micturition, dysmenorrhoea	Free fluid in pelvis	Normal study	Endometriosis	Ablation
22	Vaishnavi	38	F	Nausea, constipation	Normal study	Normal study	Adhesions	Laparoscopic adhesiolysis
23	Amirtham	46	F	LOA LOW, constipation	Probe tenderness in RIF	Normal study	Peritoneal tubercles	Biopsy
24	Ranjani	28	F	Nausea	Normal study	Free fluid in pelvis	Adhesions	Laparoscopic adhesiolysis
25	Arunthathi	32	F	White discharge pv	Free fluid in pelvis	Normal study	Hydrosalphinx	Nil
26	Manikandan	58	M	Nausea, fever	Mesenteric adenopathy	Normal study	Normal study	Nil
27	Eswar	40	M	Nil	Probe tenderness in RIF	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
28	Senthamarai	48	F	Nausea, constipation	Normal study	Normal study	Adhesions	Laparoscopic adhesiolysis
29	Ramani	40	F	Vomiting fever	Probe tenderness in RIF	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
30	Venkat	28	M	Nil	Normal study	Free fluid in RIF	Sub acute appendicitis	Laparoscopic appendectomy
31	Srinivasan	19	M	Nausea	Normal study	Mesenteric adenopathy	Sub acute appendicitis	Laparoscopic appendectomy

32	Subash	23	M	Fever	Normal study	Free fluid in RIF	Adhesions	Laparoscopic adhesiolysis
33	Abhinaya	30	F	Nausea burning micturition	Appendix not visualised	Normal study	Adhesions	Laparoscopic adhesiolysis
34	Dharani	48	F	Nil	Probe tenderness in RIF	Normal study	Adnexitis	Nil
35	Lakshman	40	M	LOA LOW, fever	Probe tenderness in RIF	Free fluid in RIF	Peritoneal tubercles	Biopsy
36	Kavirajan	28	M	Nil	Normal study	Mesenteric adenopathy	Sub acute appendicitis	Laparoscopic appendectomy
37	Alamelu	32	F	Nausea		Normal study	Sub acute appendicitis	Laparoscopic appendectomy
38	Bhaghatsingh	28	M	LOA, LOW	Normal study	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
39	Manohar	58	M	Burning micturition	Probe tenderness in RIF	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
40	Jennifer	26	F	Nausea fever	Normal study	Free fluid in RIF	Sub acute appendicitis	Laparoscopic appendectomy
41	Renuka	48	F	Vomiting	Normal study	Normal study	Ahesions	Laparoscopic adhesiolysis
42	Sambooranam	42	F	Nil	Normal study	Normal study	Ahesions	Laparoscopic adhesiolysis
43	Ramlal	26	M	Vomiting, fever	Probe tenderness in RIF	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
44	Kalaiselvi	36	F	Vomiting, fever	Normal study	Free fluid in RIF	Sub acute appendicitis	Laparoscopic appendectomy
45	Kalaivani	32	F	Burning micturition	Free fluid in pelvis	Normal study	Lt ovarian cyst	Nil
46	Chotilalmandal	28	F	Burning micturition, nausea	Normal study	Mesenteric adenopathy	Sub acute appendicitis	Laparoscopic appendectomy
47	Bharani	28	F	Burning micturition, LOA, LOW	Normal study	Normal study	Hydrosalphinx	Nil
48	Mariyammal	60	F	Nil	Normal study	Normal study	Ahesions	Laparoscopic adhesiolysis
49	Papathi	38	F	Nausea	Normal study	Normal study	Ahesions	Laparoscopic adhesiolysis
50	Banumathy	30	F	Nil	Normal study	Normal study	Peritoneal tubercles	Biopsy
51	Lakshmi	30	F	Abdominal distention, LOA, LOW	Free fluid in RIF	Normal study	Peritoneal tubercles	Biopsy
52	Gunasekar	28	M	Vomiting, nausea	Normal study	Mesenteric adenopathy	Sub acute appendicitis	Laparoscopic appendectomy
53	Bharathi	28	F	Fever, nausea	Free fluid in RIF	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
54	Periyakolanthai	32	F	Fever	Normal study	Normal study	Normal study	Nil
55	periyayee	36	F	Nil	Probe tenderness in RIF	Normal study	Adhesions	Laparoscopic adhesiolysis
56	Manohar	60	M	Vomiting, LOA, LOW	Appendix not visualised	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
57	Selvam	40	M	Nil	Normal study	Free fluid in pelvis	Sub acute appendicitis	Laparoscopic appendectomy
58	Senthil	56	M	Nausea, LOA, LOW	Probe tenderness in RIF	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
59	Kaliyaperumal	58	M	Nil	Normal study	Mesenteric adenopathy	Meckels diverticulitis	Nil
60	Anandhi	44	F	Burning micturition, dysmenorrhoea	Normal study	Normal study	Adhesions	Laparoscopic adhesiolysis
61	Jebaraj	60	M	LOA, LOW	Normal study	Mesenteric adenopathy	Mesenteric adenopathy	Biopsy
62	Chinnammal	38	F	Vomiting	Normal study	Free fluid in pelvis	Adhesions	Laparoscopic adhesiolysis
63	Yasodha	36	F	Nausea	Probe tenderness in RIF	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
64	Yamuna	42	F	Nausea, vomiting	Normal study	Normal study	Adhesions	Laparoscopic adhesiolysis
65	Sumathy	40	F	Fever, vomiting	Normal study	Mesenteric adenopathy	Sub acute appendicitis	Laparoscopic appendectomy
66	Senthil	22	M	Burning micturition	Probe tenderness in RIF	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
67	Praveena	32	F	LOW, nausea	Normal study	Normal study	Peritoneal tubercles	Biopsy

68	Kayalvizhi	30	F	Constipation	Normal study	Normal study	Adhesions	Laparoscopic adhesiolysis
69	Muniyammal	32	F	Nil	Normal study	Free fluid in pelvis	Sub acute appendicitis	Laparoscopic appendectomy
70	Bhavani	28	F	dysmenorrhoea	Normal study	Free fluid in pelvis	Endometriosis	Ablation
71	Maragathm	48	F	Nausea	Normal study	Normal study	Adhesions	Laparoscopic adhesiolysis
72	Arumugam	64	M	LOA, LOW	Normal study	Mesenteric adenopathy	Peritoneal tubercles	Biopsy
73	Elumalai	28	M	Fever	Probe tenderness in RIF	Normal study	Appendicitis	Laparoscopic appendectomy
74	Rangamma	36	F	White discharge pv	Normal study	Normal study	Hydrosalphinx	Nil
75	Bhavani	26	F	Dysmenorrhoea, LOW	Probe tenderness in RIF	Mesenteric adenopathy	Peritoneal tubercles	Biopsy
76	Gunavathy	38	F	LOA, vomiting	Normal study	Normal study	Peritoneal tubercles	Biopsy
77	Archana	30	F	Fever, nausea	Normal study	Normal study	Normal study	Nil
78	Balamurugan	32	M	Nausea	Probe tenderness in RIF	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
79	Vasanthi	20	F	Nil	Probe tenderness in RIF	Free fluid in RIF	Sub acute appendicitis	Laparoscopic appendectomy
80	Manimegalai	48	F	Nil	Normal study	Normal study	Adhesions	Laparoscopic adhesiolysis
81	Hariharan	42	M	Nausea	Free fluid in RIF	Normal study	Sub acute appendicitis	Laparoscopic appendectomy
82	Poongodi	28	F	Fever	Probe tenderness in RIF	Normal study	Sub acuteappendicitis	Laparoscopic appendectomy
83	Murugammal	58	F	Nil	Free fluid in RIF	Normal study	Adhesions	Laparoscopic adhesiolysis
84	Kalaikkannan	25	M	Nausea	Normal study	Mesenteric adenitis	Sub acute appendicitis	Laparoscopic appendectomy
85	Priyanka	30	F	Burning micturition	Enlarged ovary	Normal study	Lt ovarian cyst	Nil